Workshop Manual

SpaceFox, Space Cross, Suran, Suran Cross, Sportvan 2011 ➢

5 - Speed automated transmission 0C3

Edition 05.2011

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Repair Group

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

Contents

00 – Technical data

1 Transmission identification

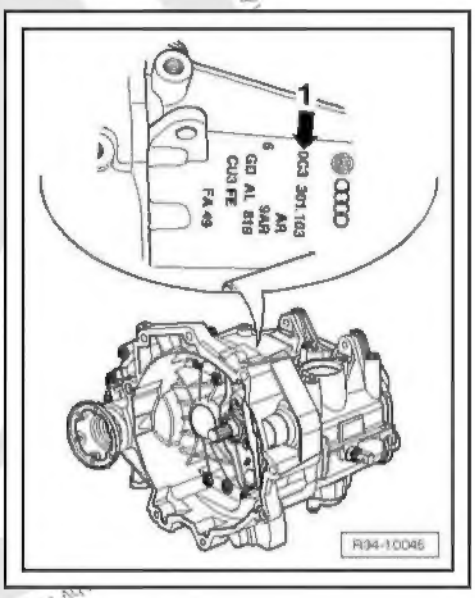
The 5-speed (ASG) automated transmission 0C3 is mounted in the SpaceFox, Space Cross, Suran, Suran Cross 2011 ➢.

Allocation ⇒ page 1 .

1.1 Location on transmission

Prefixes (Identification letters) and manufacturing date:

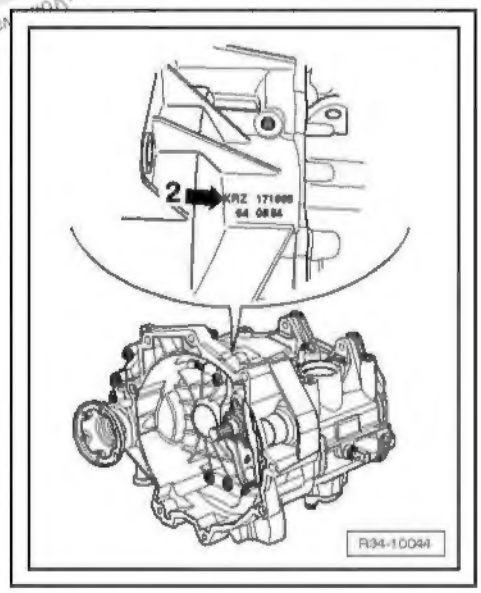
"5-speed (ASG) automated transmission 0C3" -arrow 1-.



Transmission prefix and manufacturing date -arrow 2-.

Example:

Example:	KRZ	17	10	08
	Prefix	Day	Month	Production year 2008



Supplementary data depend on the manufacturing:

Note

- *Eventual existing additional data is related to the manufacturing process.*
- *The transmission prefixes can also be found on the vehicle ID tag.*

1.2 Prefix, correspondence, transmission ratio, filling volume

Identification letters (prefix)		5-speed 0C3
Identification letters (prefix)		KRZ
Manufacturing	from	02.10
	to	

Identification letters (prefix)		5-speed 0C3
Identification letters (prefix)		KRZ
Allocation	Model	SpaceFox, Space Cross, Suran, Suran Cross 2011 ▸
	Engine	1.6 l - 74 kW
Transmission ratio $Z_2 : Z_1$:	Differential	67 : 16 = 4,187
	1_{nd}. gear	38 : 11 = 3,454
	2_{nd}. gear	45 : 20 = 2,25
	3_{nd}. gear	44 : 29 = 1,517
	4_{nd}. gear	40 : 39 = 1,025
	5_{nd}. gear	37 : 50 = 0,74
	6_{nd}. gear	
	Reverse gear	35 : 24 x 24 : 11 = 3,182
	Speedometer	Electronic

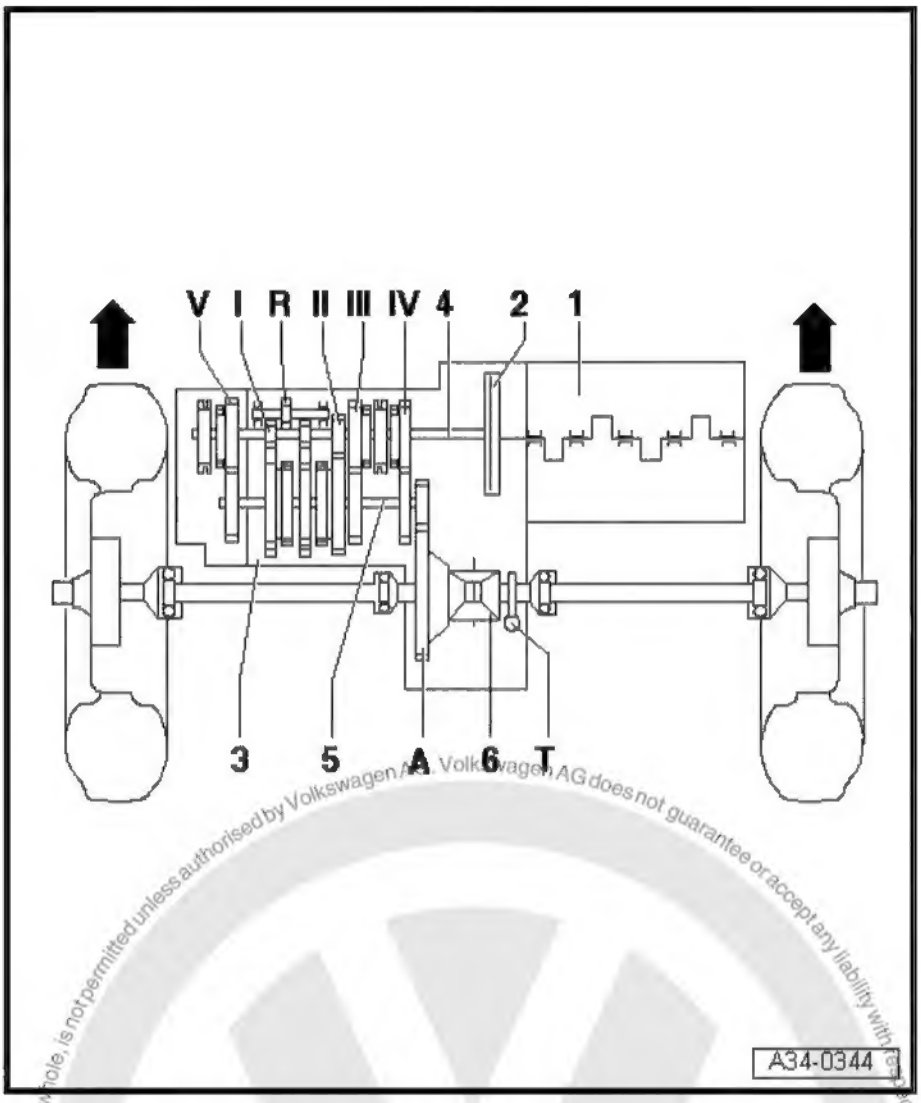
Filling capacity		2.1 liters
Oil specification for transmission	from 02.10	Oil for mechanical transmission -G 052 512 A2-
		or see ⇒ Chemical Materials Manual

Filling capacity		0.6 liters
Oil specification for gearshift mechanism	from 02.10	Oil for gear selection mechanism -G 052 512 S1-
		or see ⇒ Chemical Materials Manual

2 Transmission assembly scheme

2.1 Nomenclature

1 - Engine
2 - Clutch
3 - Automated transmission
4 - Primary shaft/driving shaft
5 - Secondary shaft/pinion shaft
6 - Differential



Note

The arrows indicate run direction.

2.2 Gear ratios

I - 1nd. gear

II - 2nd. gear

III - 3nd. gear

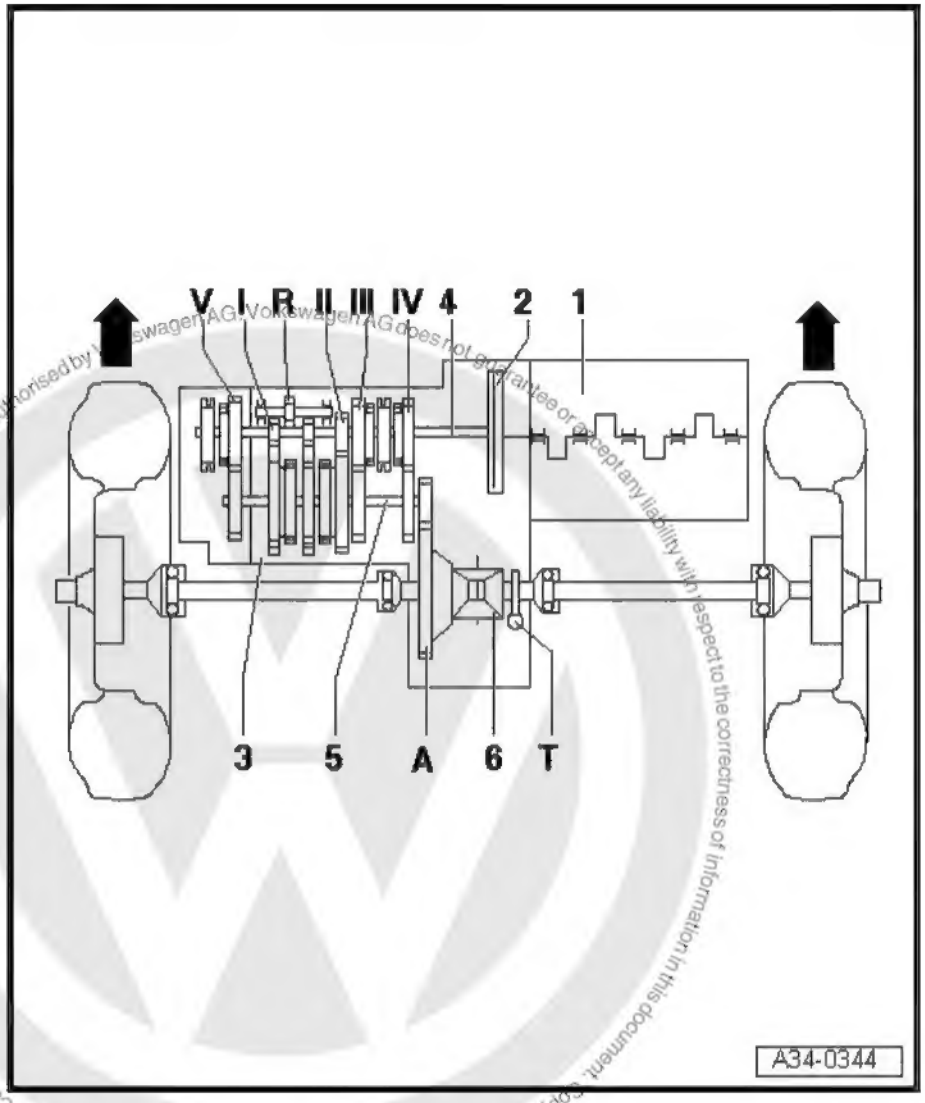
IV - 4nd. gear

V - 5nd. gear

R - Reverse gear

A - Sprocket

T - Speedometer control



Note

The arrows indicate run direction.

3 Gearbox ratio calculation"i"

Example:

	$5_{nd.}$ gear	Sprocket
Driving gear	$ZG_1 = 50$	$ZA_1 = 18$
Driven gear	$ZG_2 = 37$	$ZA_2 = 65$

$i = Z_2 : Z_1$

i_G = gearbox ratio = $ZG_2 : ZG_1 = 37 : 50 = 0{,}740$

i_A = Differential gearbox ratio = $ZA_2 : ZA_1 = 65 : 18 = 3{,}611$

i_{total} = Overall gearbox ratio = $i_G \times i_A = 0{,}740 \times 3.611 = 2.672$

1) Z_1 = Number of teeth of drive gear Z_2 = Number of teeth of driven gear

4 General repair instructions

WARNING

For achieving a correct and successful repair of the transmission, maximum rigor and cleanliness, as well as accessible tools in good conditions, are essential conditions. Obviously, all the normal basic safety rules also apply in repairs.

We put together here a series of indications applicable to several operations which are usually dispersed along the Repair Manual. These indications apply to this Repair Manual.

- *First, clean the union points and adjacent regions before separating them.*
- *Put the disassembled parts on a clean base and cover them to prevent dirt. Use transparent film and paper. Do not use cloths that fray!*
- *Assemble only clean parts: Take the parts out of the packaging just before their assembly.*
- *Carefully cover or close open components, in case repair is not carried out immediately.*

4.1 Gearbox

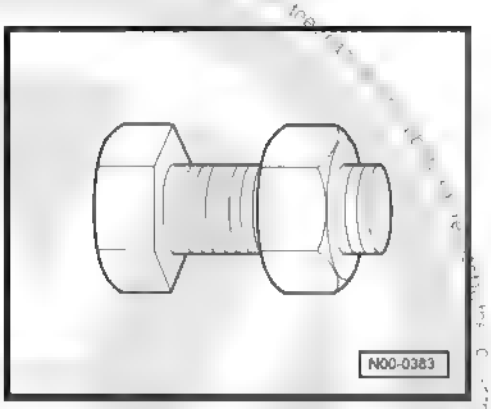
- When assembling the transmission, pay attention on the correct seating of guide pins between engine and transmission.
- Whenever the transmission is replaced, fill with oil until the lower edge of the filling hole.
- Filling capacity and specification ⇒ page 1 .

4.2 Gaskets and retainers

- Always change O-rings, retainers and gaskets.
- After removing the gaskets, check whether the stop surface has burrs or damage resulting from the assembly.
- Before installing the retainers, slightly lubricate the outer diameter and fill the gap between the sealing lips -arrow- with Grease -G 052 128 A1- up to half height. Refer to the ⇒ Chemical Materials Manual .

4.3 Screws, nuts

- Loosen and tighten cover and case fastening screws or nuts in a cross pattern and in stages.
- The tightening torques indicated apply to non-lubricated screws and nuts.
- The screw threads with locking paste must be cleaned with wire brush. Install screws with Locking paste -AMV 185 100 A1- . Refer to the ⇒ Chemical Materials Manual .
- All the self-locking screw holes must be cleaned from locking paste residues with screw tap. Otherwise, there is the risk of breaking the screws when they are removed again.



WARNING

Always replace self-locking nuts and bolts which were subjected to angular torque.

4.4 Roller Bearings

- Lubricate all the transmission roller bearings with gear oil before installing them.
- Needle roller bearings must fit into the labeled part (highest thickness of the plate), towards the tool.
- The tapered roller bearings installed in a same shaft must be replaced as a set. If possible, they must be supplied by the same manufacturer.
- To install, heat inside rings up to approximately 100 °C.
- Do not change outside and inside rings on a roller bearing by the rings from another roller bearing with the same size. Roller bearings are installed in pairs.

4.5 Adjustment shims

- Check the shim thicknesses in several places with micrometer. The existence of different tolerances enables calibrating the required shim thickness with accuracy.
- Check for burrs and damages.
- Only install adjustment shims in perfect conditions.

4.6 Synchronizer rings

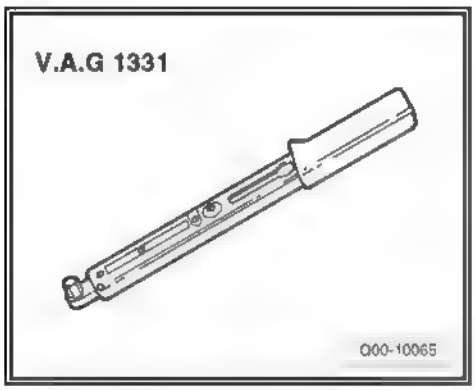
- They should not be inverted. When reusing synchronizer rings, always install them on the same gear pair.
- Check for wear, and change them, if required
- Lubricate with transmission oil before installing.

30 – Clutch - control system

1 Clutch drive mechanism - repair

Special tools and workshop equipment required

- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-



1.1 Hydraulic system - assembly overview

1 - Gear selection mechanism - adjust
- ❑ "Actuator Pack".
- ❑ Remove and install ⇒ page 31 .
- ❑ Disassemble and assemble ⇒ page 39 .

2 - Phalange set/selector shaft

3 - Pressure tube
- ❑ Remove and install ⇒ page 45 .

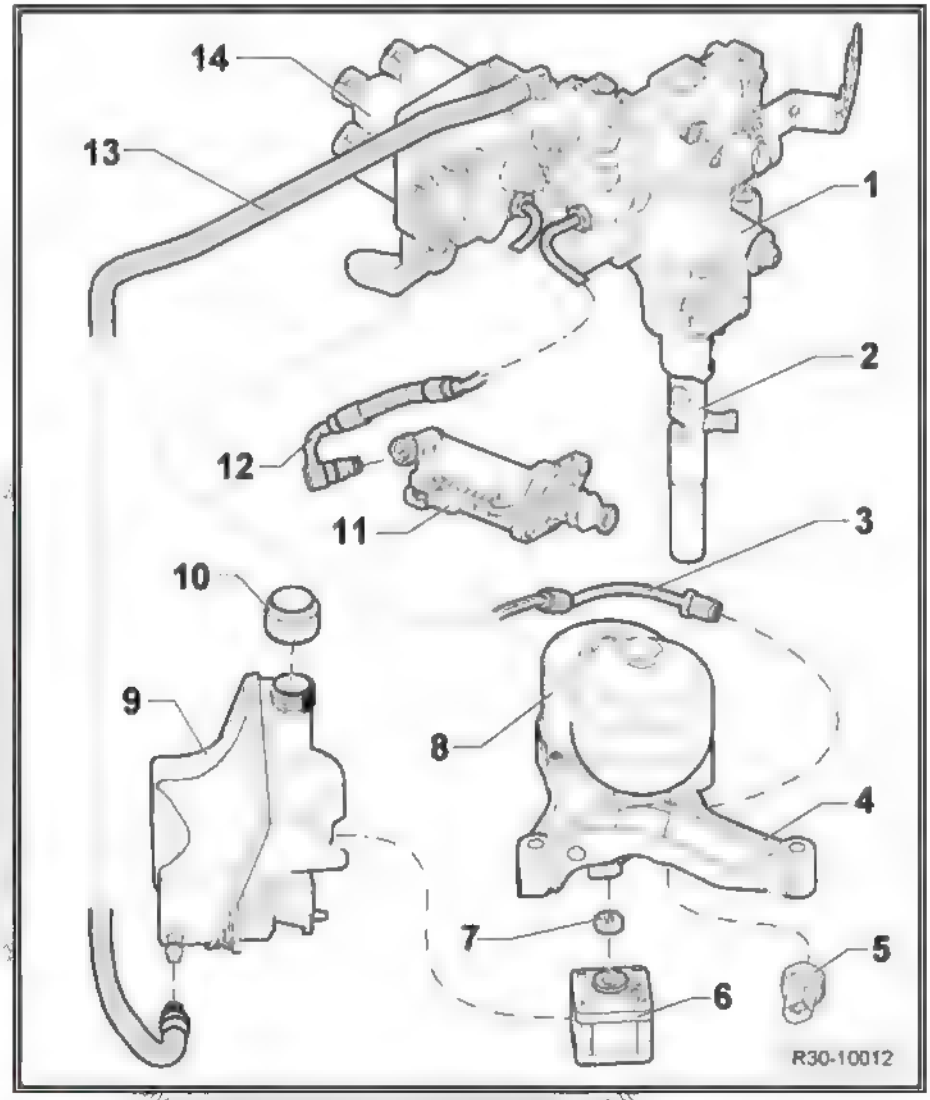
4 - Hydraulic set
- ❑ "Power Pack".
- ❑ Remove and install ⇒ page 31 .
- ❑ Disassemble and assemble ⇒ page 39 .

5 - Transmission hydraulic pressure sensor -G270-
- ❑ Remove and install ⇒ page 46 .
- ❑ Apply the Nyogel -G 052.817.A1- to the contact pins.

6 - Hydraulic transmission pump -V387-
- ❑ Remove and install ⇒ page 47 .

7 - Coupling

8 - Electric motor for the Hydraulic transmission pump -V387-
- ❑ Remove and install ⇒ page 46 .



❑ Apply the Nyogel -G 052.817.A1- to the contact pins.

9 - Hydraulic system oil reservoir

❑ Remove and install ⇒ page 48 .

❑ Use Oil for gear selection mechanism -G.052.512.S1- .

❑ Check and top up oil level ⇒ page 63 .

10 - Reservoir lid

11 - Slave cylinder - clutch hydraulic drive

❑ The Clutch position sensor -G476- is incorporated with the slave cylinder Apply the Nyogel -G 052.817.A1- to the contact pins.

❑ Remove and install ⇒ page 9 .

12 - High-pressure slave cylinder

❑ Remove and install ⇒ page 44 .

13 - Return hose

❑ Remove and install ⇒ page 49 .

14 - Valve set

The valve set has the following components:

- Clutch actuator valve -N255- "EV0".
- Gear selection valve 1 -N284- "EV1".
- Gear selection valve 2 -N285- "EV2".
- Gear selection valve 3 -N286- "EV3".

❑ Remove and install ⇒ page 43 .

1.2 Clutch hydraulic drive slave cylinder - remove and install

1.2.1 Removal

– Operate the parking brake.

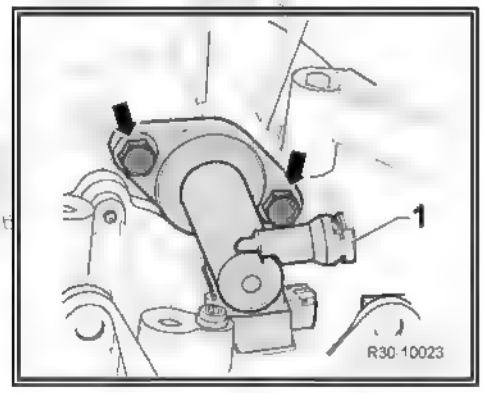
– Turn vehicle on.

– Place selector lever in position "N".

– Remove the gear selection mechanism ⇒ page 31 .

– Loosen the fastening screws -arrows- on the actuator slave cylinder -1-.

– Remove activation slave cylinder -1-.



1.2.2 Installation

Install by inverting the removal sequence, paying attention to the following:

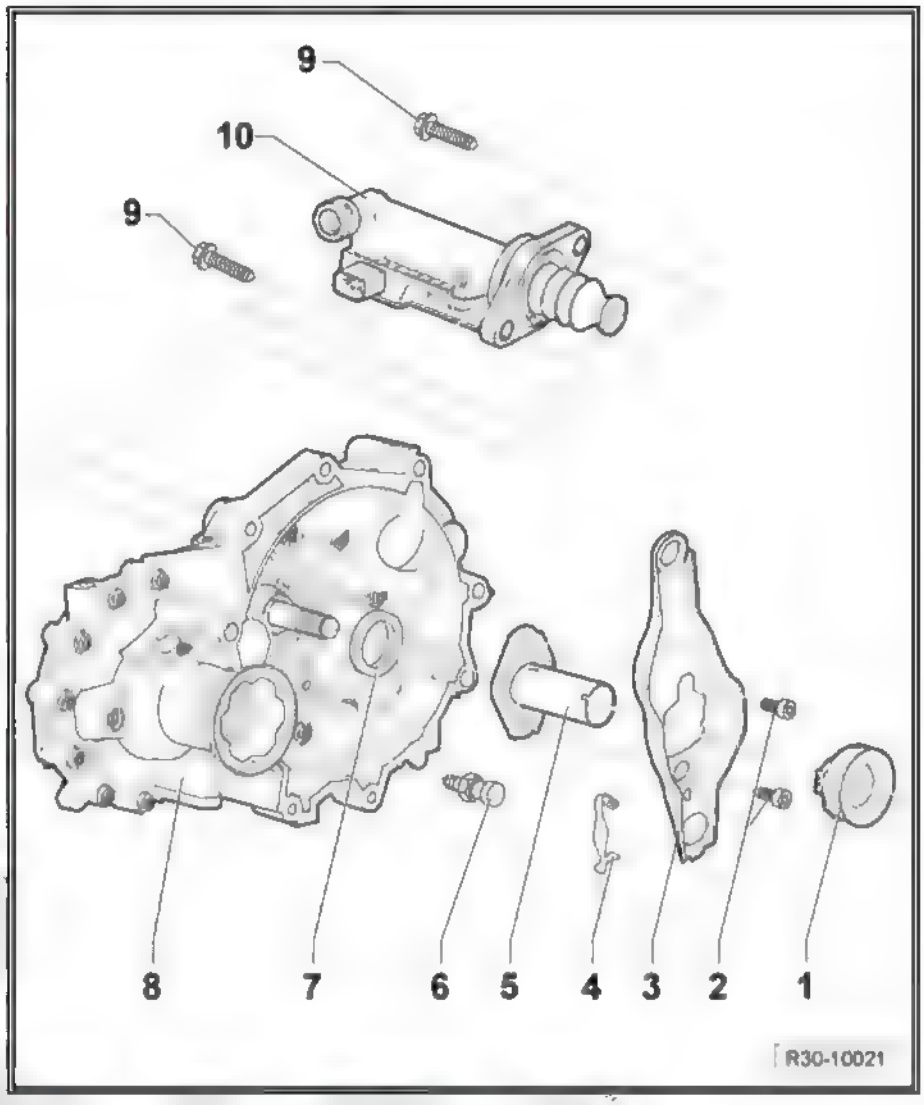
– Tighten the fastening screws for the activation slave cylinder with a torque of ➢ Item 9 (page 11) .

– Assemble the gear selection mechanism ⇢ page 31 .

Note

After installing, it is necessary to proceed the hydraulic system basic settings ⇒ Vehicle diagnosis, testing and information system VAS 5051.

2 Clutch drive mechanism - repair



1 - Clutch roller bearing
- ❑ Remove and install with the clutch disengaging lever ⇢ Item 3 (page 11) and roller bearing's guide bushing ⇒ Item 5 (page 11) .
- ❑ Do not wash the clutch roller bearing, only clean it with cloth.
- ❑ Change noisy roller bearings.

2 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

3 - Clutch disengaging lever
- ❑ Remove and install ⇒ page 12
- ❑ Remove and install with the clutch roller bearing ⇒ Item 1 (page 11) and roller bearing's guide bushing ⇒ Item 5 (page 11) .
- ❑ Lubricate the stop point on the spherical pin with Lubricating grease MoS2 , or consult the ⇒ Chemical Materials Manual .

4 - Lever pressure lever
- ❑ Fasten on the clutch lever.

5 - Roller bearing's guide bushing
- ❑ Remove and install ⇒ page 12
- ❑ Remove and install with the clutch roller bearing ⇢ tem 1 (page 11) and roller bearing's disengaging lever ⇒ Item 3 (page 11) .

6 - Ball pin
- ❑ 20 Nm.
- ❑ Lubricate with Lubricating grease MoS2 , or consult the ⇢ Chemical Materials Manual .

7 - Sealing ring for primary shaft
- ❑ Replace ⇢ page 82

8 - Gearbox

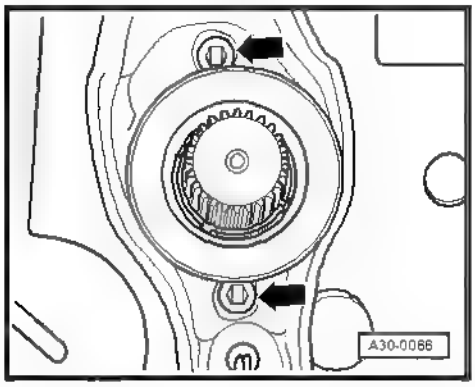
9 - Screw
- ❑ 20 Nm

10 - Slave cylinder - clutch hydraulic drive
- ❑ With Clutch position sensor -G476- .
- ❑ Remove and install ⇢ page 9
- ❑ Lubricate the stem tip with Lubricating grease MoS2 or see ⇢ Chemical Materials Manual

Removing and installing the clutch lever with the clutch bearing and bearing guide

- Loosen the fastening screws -arrows-.
- Separate clutch lever, with the clutch collar and guide bushing, from primary shaft and spherical pin

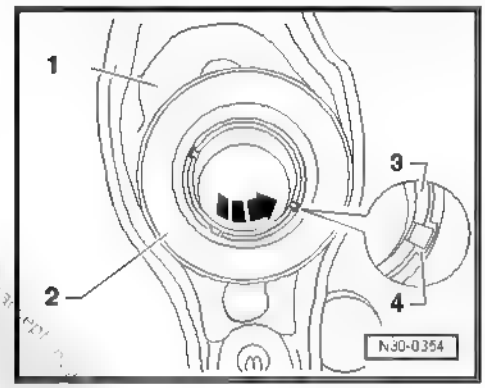
Installation is carried out in the reverse order of removal



Removing and installing the bearing's guide bushing

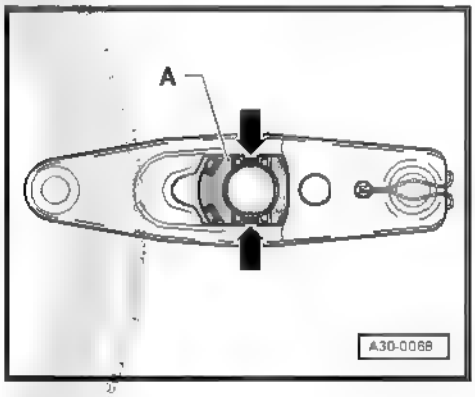
- Displace the guide bushing -3- from the clutch collar -2- , by pushing it upwards.
- While securing the collar -2-, turn guide bushing -3- 90° towards arrow, until its fitting edges match the slots -4- on collar.
- Remove guide bushing from collar.

Installation is carried out in the reverse order of removal.



Removing and installing clutch collar

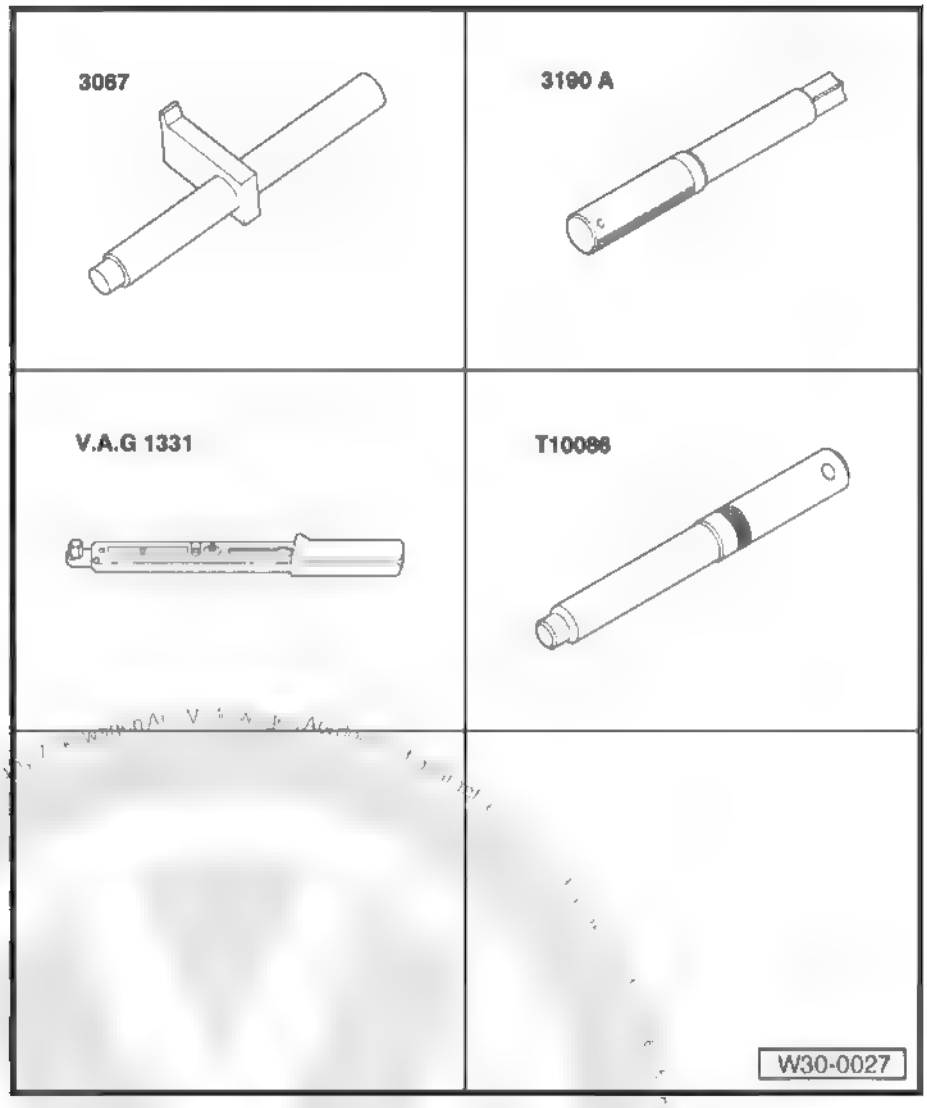
- Compress the fitting edges -arrows- located on the rear part of the clutch lever, and pull collar -A- out of the lever.
- To install collar -A-, engage it on the clutch lever until fitting the edges -arrows- fit in.



3 Clutch - repair

Special tools and workshop equipment required

- Latch -3067-
- Guide Pin or VW 3190A -3190A-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- Guide Pin -T 10086-



Note

- *Change clutch discs and plates with damaged or loosened riveted unions*
- *The clutch disc and plate must correspond each other according to the ⇒ Electronic Parts Catalogue (ETKA) and the engine prefixes.*

1 - Flywheel

- ❑ Pay attention to the perfect fitting of the guide pins.
- ❑ The contact surface of the clutch disc shall be free of oil and grease, and should not have grooves.
- ❑ Remove and install ➔ Engine; Rep. Gr. 13 ; Crankshaft, pistons .

2 - Clutch disc

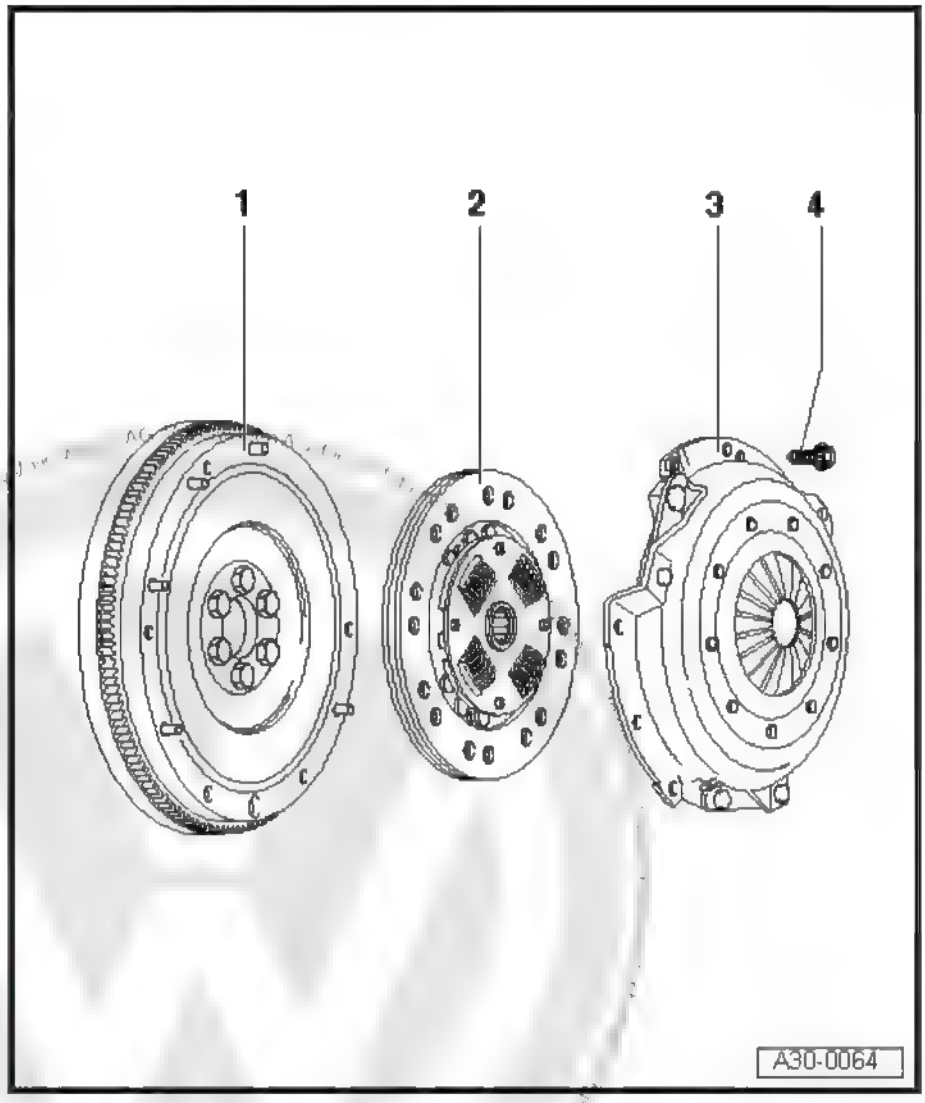
- ❑ Installation position: the spring box shall stay opposite to the clutch pressure plate.
- ❑ centralization for vehicles with petrol engine ⇒ page 14
- ❑ Apply a slight coat of grease on the splines.

Note

3 - Clutch plate

- ❑ Remove and install on vehicles with petrol engine ⇒ page 14
- ❑ Check membrane spring height ⇒ page 15

Note

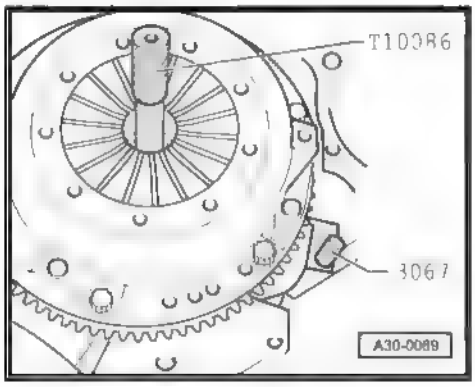


4 - Screw

- ❑ 20 Nm.
- ❑ Loosen and tighten gradually and diagonally.

Center the clutch disc using the Guide Pin -T 10086- remove and install the clutch plate

- – Loosen and tighten screws in a cross and phased pattern.
- – To remove, install Latch -3067- .

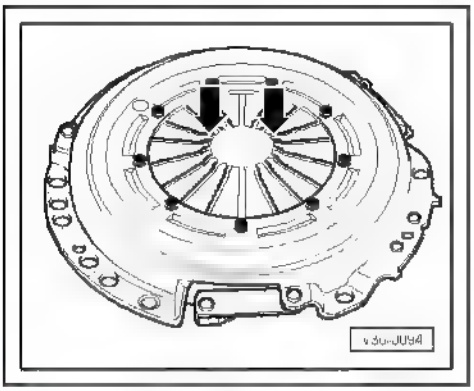


Note

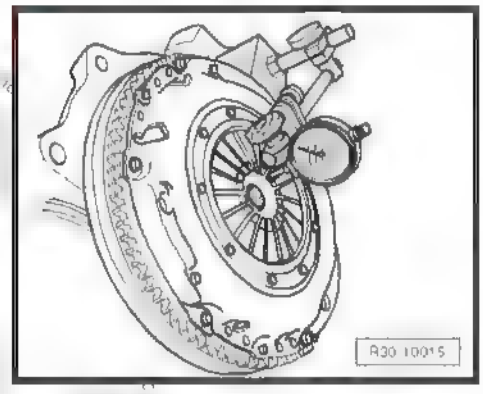
- ♦ *The clutch plate and clutch disc contact surfaces must be completely seated on the engine's flywheel.*
- ♦ *Tighten evenly the fastening screws, in a cross pattern, to prevent damages on the membrane spring of the clutch plate and the guide pins of the engine's flywheel.*

Measuring the height of the membrane spring

– Install the clutch ➢ Item 3 (page 14) .



– Fasten centesimal dial gauge support somewhere on a flat surface of the engine block.
– Reset centesimal dial gauge to zero in one of the clutch plate membrane spring tabs.
– Measure height of each tab and write down the values.
– Consider the highest and lowest values found.
– The sum of obtained values on the right and left of the zero point at the centesimal dial gauge should not be higher than 0.80 mm. Otherwise, renew clutch.



34 – Drive, housing

1 Diagnosis, measurement and information system

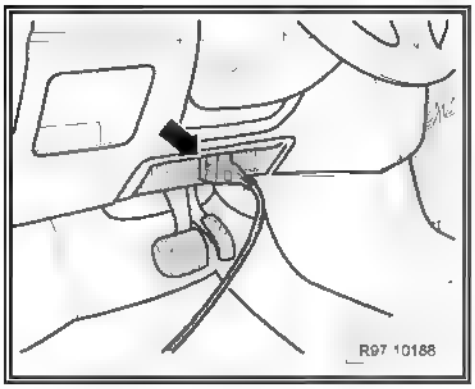
Special tools and workshop equipment required

- Diagnosis, Measurement and Information System -VAS 5051-
- Diagnosis, Measurement and Information System -VAS 5052-
- Diagnostic cable -VAS 5051/6B-
- Diagnostic cable -VAS 5052/3A-
- Wireless diagnostic connector -VAS 5054A-

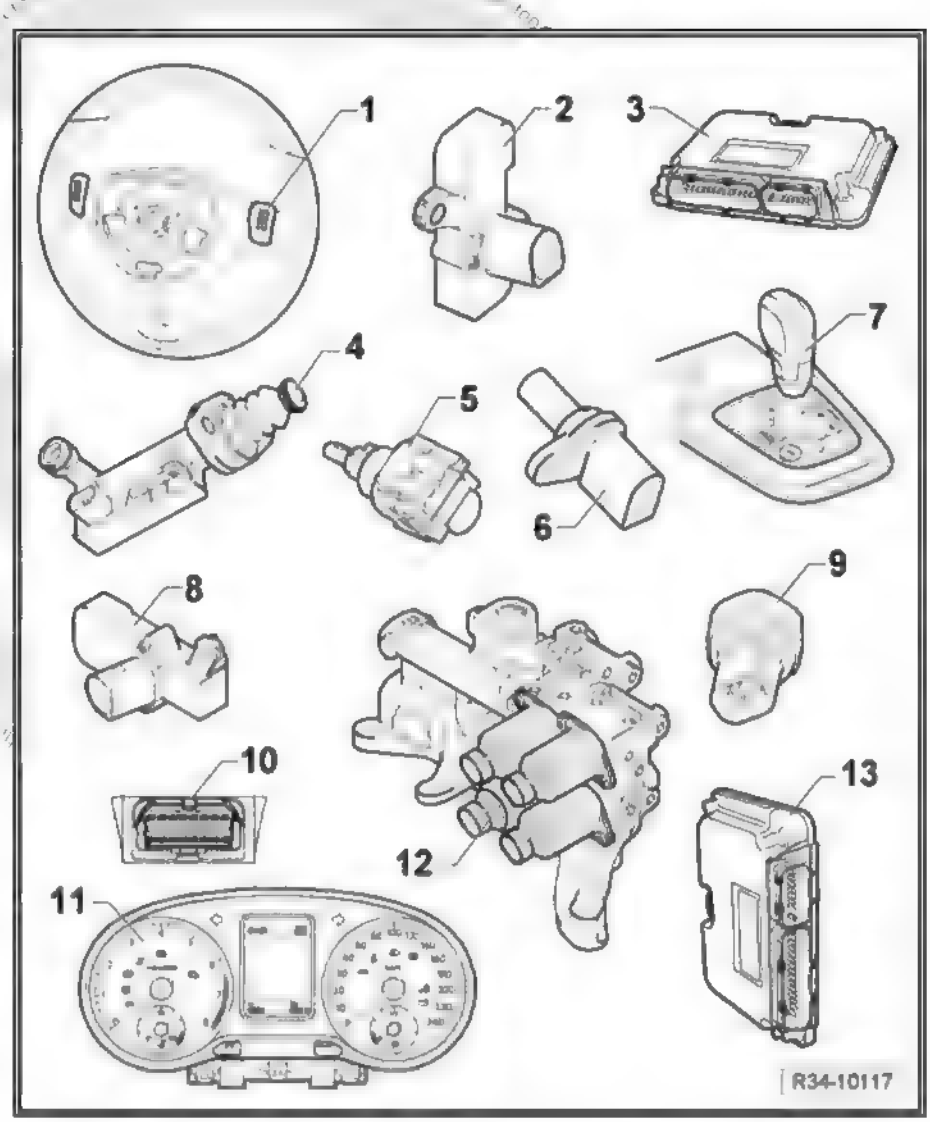
1.1 Connect

– Operate the parking brake
– Position the gear shifter "N".
– Turn vehicle on.

- Connect the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ General information; Rep Gr. 97 ; Cables and wiring harnesses .
- Proceed by selecting the indicated functions ⇒ Vehicle diagnosis, testing and information system VAS 5051.



2 Electronic components and installation locations



1 - Steering wheel

- Locate, remove and install "Tiptronic" upshift switch on the steering wheel -E438- and/or "Tiptronic" downshift switch on the steering wheel -E439- ⇒ page 20 .
- Check with the Diagnosis, Measurement and Information System - VAS 5051- or Diagnosis, Measurement and Information System - VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

2 - Gear identification sensor -G604-

- Locate, remove and install ⇒ page 20 .
- 3.6 ± 0.6 Nm.
- Check with the Diagnosis, Measurement and Information System - VAS 5051- or Diagnosis, Measurement and Information System - VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

3 - Engine control unit -J623-

- Locating, removing and installing ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .
- Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

4 - Slave cylinder - clutch hydraulic drive

- The Clutch position sensor -G476- is incorporated to the slave cylinder.
- Remove and install ⇒ page 9 .
- Lubricate the stem tip with Lubricating grease MoS2 or see ⇒ Chemical Materials Manual
- Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051

5 - Brake light switch -F-

- Remove and install ⇒ Brake system; Rep. Gr. 46 , Brakes - Mechanical systems
- Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051

6 - Transmission rotation sensor -G182-

- Locate, remove and install ⇒ page 21 .
- Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051

7 - Selector lever

- ❑ A The gear indications on the selector lever -Y5- is integrated in the upper central console cover.
- ❑ A The Selector lever sensor control unit -J587- is incorporated in the selector lever
- ❑ Remove and install ⇒ page 24 .
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051

8 - Gear identification sensor 2 -G616-

- ❑ Locate, remove and install ⇒ page 22 .
- ❑ 3.6 ± 0.6 Nm.
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

9 - Transmission hydraulic pressure sensor -G270-

- ❑ Remove and install ⇒ page 46 .
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

10 - Diagnostic port

- ❑ Location ⇒ page 22

11 - Selected gear indicator -Y6-

- ❑ Location ⇒ page 22
- ❑ Remove and install ⇒ Electrical equipment; Rep. Gr. 90 ; Instrument case, indicators
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

12 - Valve set

The valve set has the following components:

- ♦ Clutch actuator valve -N255- "EV0".
- ♦ Gear selection valve 1 -N284- "EV1".
- ♦ Gear selection valve 2 -N285- "EV2".
- ♦ Gear selection valve 3 -N286- "EV3".

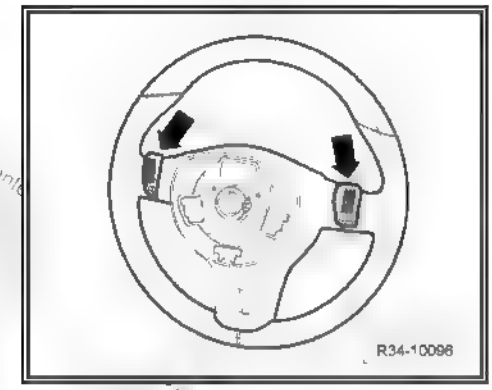
- ❑ Remove and install ⇒ page 43 .
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

13 - Automatic transmission control unit -J217-

- ❑ Locate, remove and install ⇒ page 23 .
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

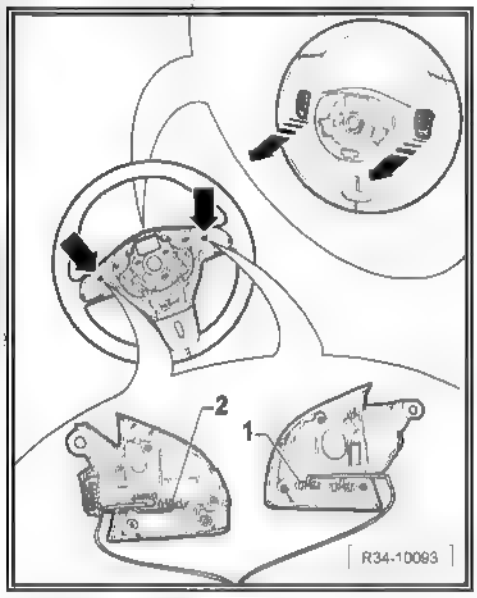
Location of the "Tiptronic" upshift switch on the steering wheel -E438- and/or "Tiptronic" downshift switch on the steering wheel -E439-

Location: Are located on the steering wheel -arrows-



Removal:

- Turn the ignition and all electric components off and remove the key from the ignition.
- Disconnect the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove the Ignition device for the driver's airbag -N95- ⇒ Body - internal mountings; Rep. Gr. 69 ; Occupants' protection or remove the Horn activator -H- ⇒ Running gear, ??axles, ?? steering; Rep. Gr. 48 ; Steering .
- Remove the command key from the multifunction steering wheel ⇒ Communication; Rep. Gr. 91 ; Radio, telephone, navigation system .
- Pull off connectors -1- and -2-.
- Loosen the fastening screws -arrows- and remove the "Tiptronic" upshift switch on the steering wheel -E438- and/or "Tiptronic" downshift switch on the steering wheel -E439- in the direction of movement -arrows-.



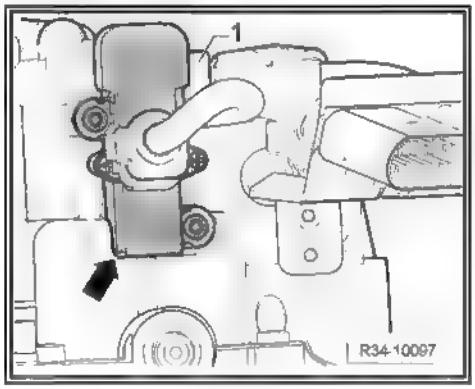
Installation:

Install by inverting the removal sequence, paying attention to the following:

- After installation, perform self-diagnostic ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Location of the Gear identification sensor -G604-

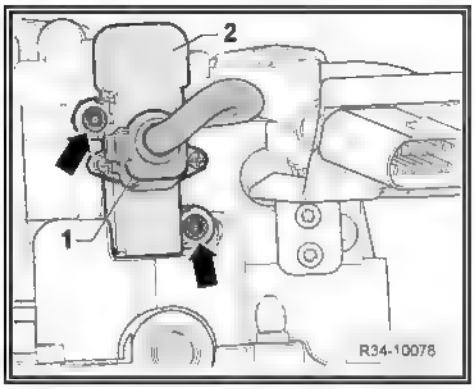
Location: is located in the gear selection mechanism "Actuator Pack" -1-.



Removal:

- Turn the ignition and all electric components off and remove the key from the ignition.
- Disconnect and remove the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove the air filter, it is installed behind the Battery -A- ⇒ Engine, Rep. Gr. 24 ; Fuel supply - injection system .
- Remove the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .

- Pull off connector -1-.
- Loosen the fastening screws -arrows- and remove the Gear identification sensor -G604- -2-.



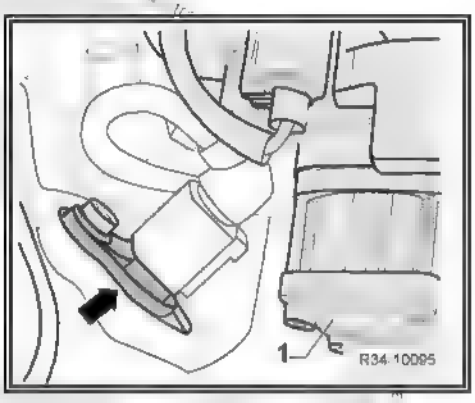
Installation:

Install by inverting the removal sequence, paying attention to the following:

- Tighten the fastening screws -arrows- with torque ⇒ Item 2 (page 18) .
- Apply the Nyogel -G.052 817.A1- to the contact pins.
- After installation, perform self-diagnostic and basic adjustments ⇒ Vehicle diagnosis, testing and information system VAS 5051.

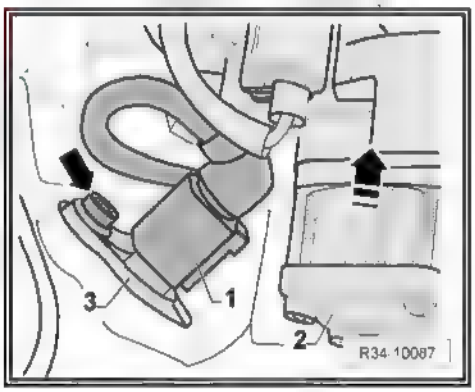
Location of the Transmission rotation sensor -G182-

Location: installed on the transmission case -arrow- next the gearbox cover and the Hydraulic transmission pump -V387- -1-.



Removal:

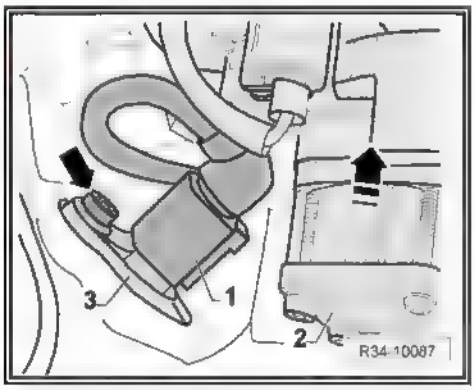
- Turn the ignition and all electric components off and remove the key from the ignition.
- Disconnect the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove the air filter, it is installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .
- Loosen the fastening screws (3 units) ⇒ Item 1 (page 31) , for the hydraulic set "Power Pack" ⇒ Item 4 (page 8) .
- Lift the vehicle.
- Pull off connector -1- of Transmission rotation sensor -G182- -3-. To facilitate operation, use the Hook -T10118- and at the same time, slightly move the hydraulic set "Power Pack" -2- upwards.
- Release the fastening screw -arrow-.
- Remove the Transmission rotation sensor -G182- -3-.



Installation:

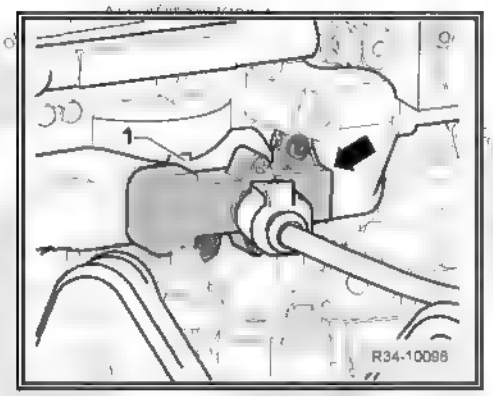
Install by inverting the removal sequence, paying attention to the following:

- Replace the sealing ring (O-ring) ⇒ Item 23 (page 81) .
- Replace fastening screws.
- Tighten the fastening screw -arrow- of Transmission rotation sensor -G182- -3- with torque ⇒ Item 22 (page 81) .
- Tighten the fastening screws for the hydraulic set "Power Pack" with torque ⇒ Item 1 (page 31) .
- Lower vehicle.
- After installation, perform self-diagnostic and basic adjustments ⇒ Vehicle diagnosis, testing and information system VAS 5051



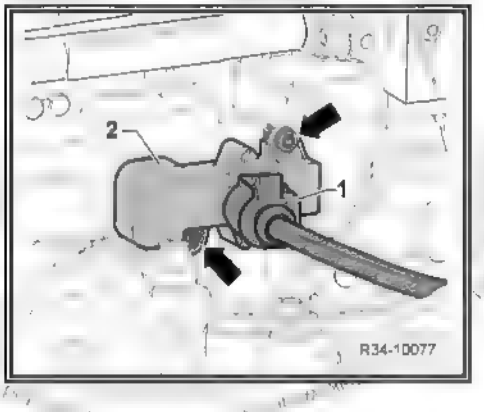
Location of the Gear identification sensor 2 -G616-

Location: is located in the gear selection mechanism "Actuator Pack".



Removal:

- Turn the ignition and all electric components off and remove the key from the ignition.
- Disconnect and remove the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove the air filter, it is installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .
- Remove the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Pull off connector -1-.
- Loosen the fastening screws -arrows- and remove the Gear identification sensor 2 -G616- -2-.

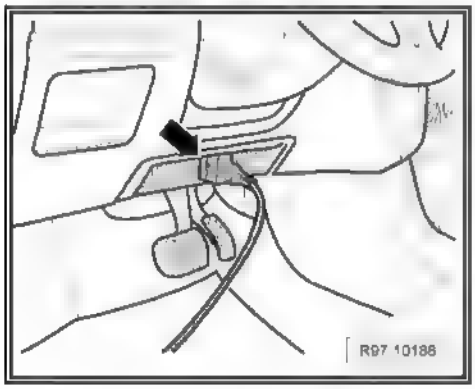


Installation:

Install by inverting the removal sequence, paying attention to the following:

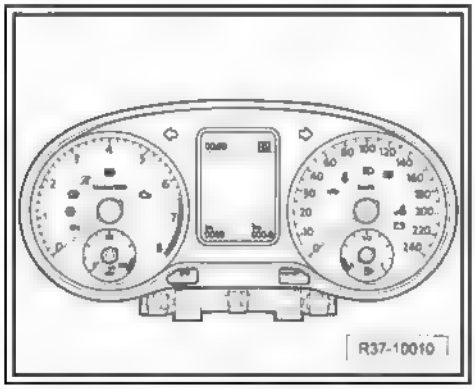
- Tighten the fastening screws -arrows- with torque ⇒ Item 8 (page 19) .
- Apply the Nyogel -G.052.817.A1- to the contact pins.
- After installation, perform self-diagnostic and basic adjustments ⇒ Vehicle diagnosis, testing and information system VAS 5051.

Diagnostic port



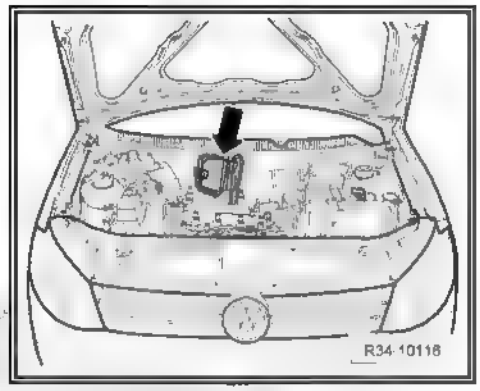
Selected gear indicator -Y6-

Location: of the instrument panel.



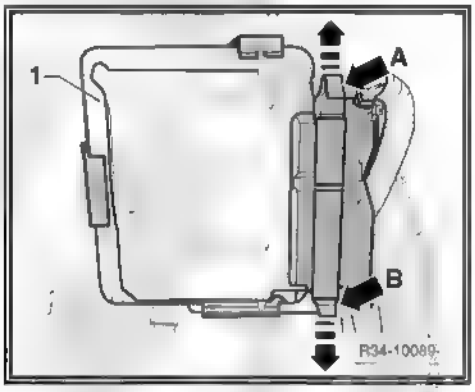
Automatic transmission control unit -J217-

Location: The engine compartment partition panel-arrow-



Removal:

- Turn the ignition off.
- Pull the locks -arrow A- and -arrow B- in the direction of the arrows and disconnect the multiple connectors from the Automatic transmission control unit -J217- -1-.
- Remove the Automatic transmission control unit -J217- -1- from the fastening support.



Installation:

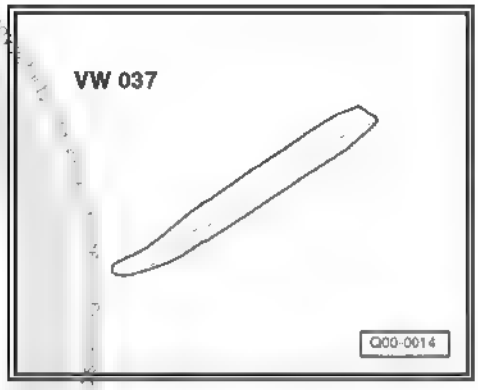
Install by inverting the removal sequence, paying attention to the following:

- After installation, perform self-diagnostic and basic adjustments ⇒ Vehicle diagnosis, testing and information system VAS 5051.

3 Selector lever

Special tools and workshop equipment required

- Spatula -VW 037-



3.1 Selector lever - general overview of assembly

1 - Selector lever handle
- Remove and install ⇒ page 25 .

2 - Upper cover
- Remove and install ⇒ page 26 .
- A The gear indications on the selector lever - Y5- is integrated in the upper cover.

3 - Screw
- 1.5 Nm

4 - Centre console (upper)
- Remove and install ⇒ Body - internal mountings; Rep. Gr. 68 ; Internal equipment .

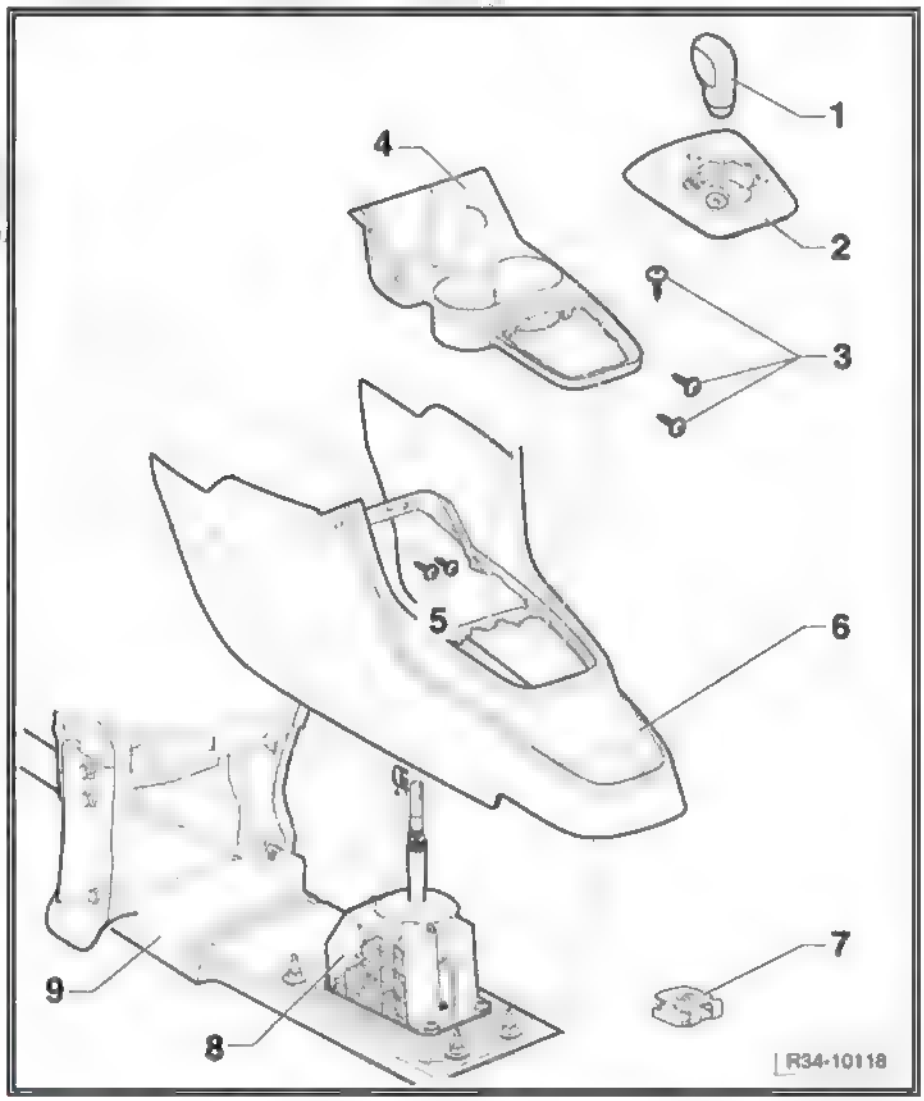
5 - Screw
- 1.5 Nm

6 - Centre console (lower)
- Remove and install ⇒ Body - internal mountings; Rep. Gr. 68 ; Internal equipment .

7 - Clip nut

8 - Selector lever
- Remove and install ⇒ page 27
- Check the operating positions ⇒ page 30

9 - Body



1 - Selection lever caul
- ❑ Adjust bellows ➔ page 29

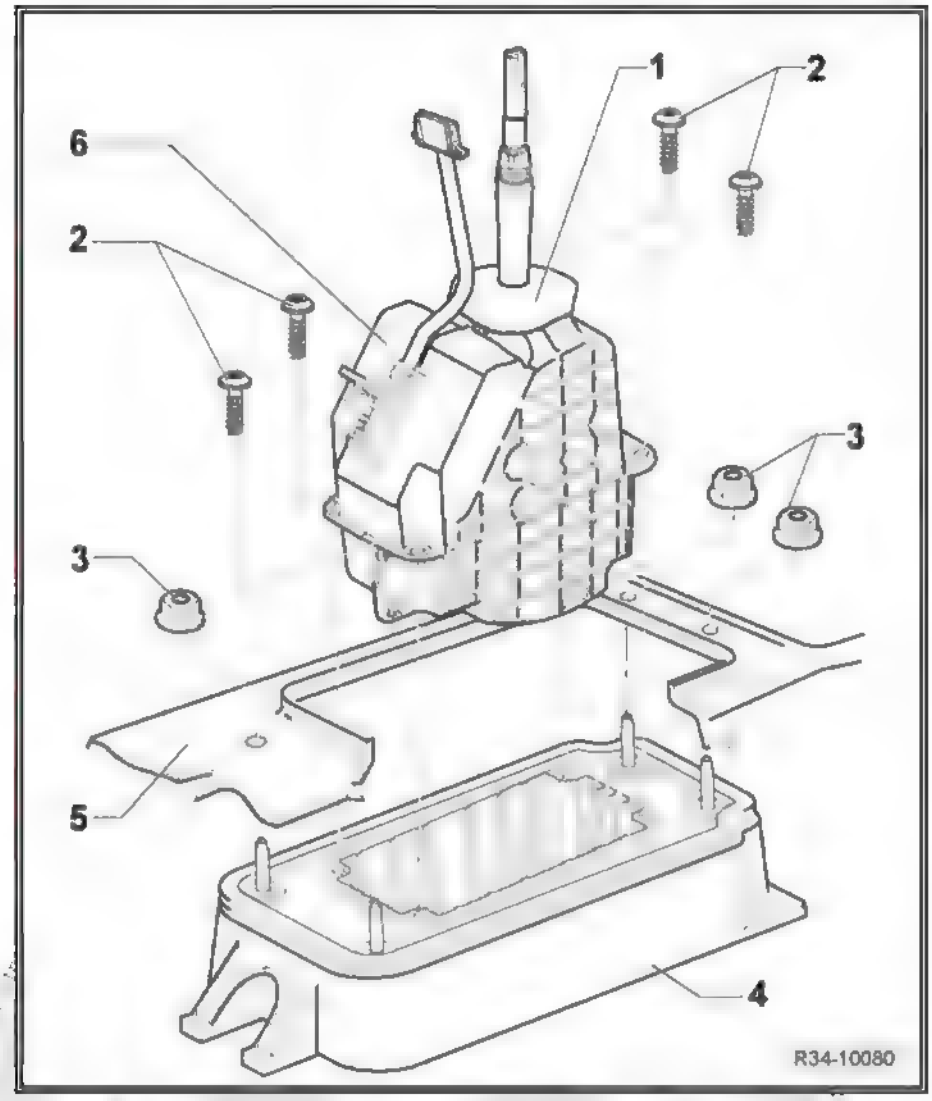
2 - Screw
- ❑ 8 Nm

3 - Hexagonal nuts
- ❑ 4 units
- ❑ 8 Nm

4 - Lower selector lever cover
- ❑ Remove and install ⇒ page 28

5 - Body

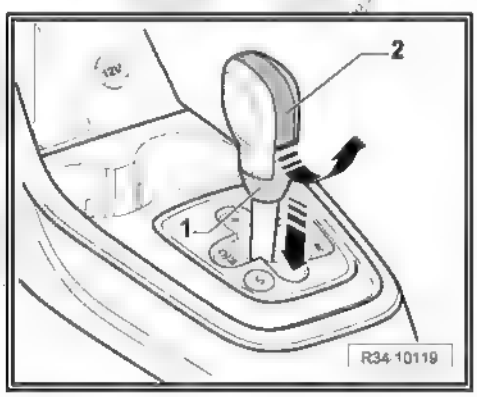
6 - Selector lever
- ❑ Remove and install ⇒ page 27
- ❑ Check the operating positions ⇒ page 30



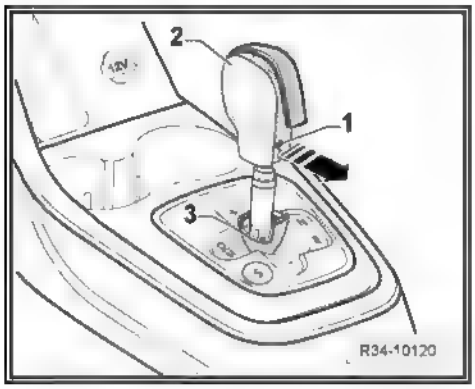
3.2 Selector lever handle - remove and install

3.2.1 Removal

– Detach the lower cover -1- in the direction of -arrow- and then the upper cover -2- in the direction of the -arrow-.



– Release the lock -1- in the direction of the -arrow-.
– Remove the selector lever handle -2- then the lower cover -3-.



3.2.2 Installation

Install by inverting the removal sequence, paying attention to the following:

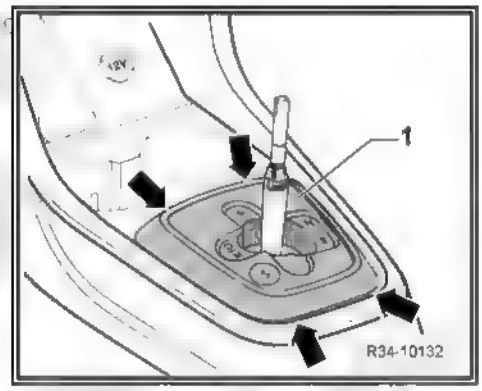
Note

After installation, check the operating positions of the selector lever ⇒ page 30 .

3.3 Upper selector lever cover - remove and install

3.3.1 Removal

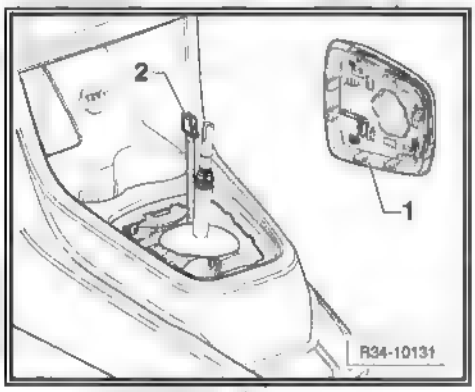
– Remove the selector lever handle ⇒ page 25 .
– Use the Spatula -VW 037- and detach the upper cover -1- at the fastening points -arrows-.



Note

Carefully remove in order not to damage the upper cover or the lower console.

– Pull off connector -2- from the upper cover -1-.



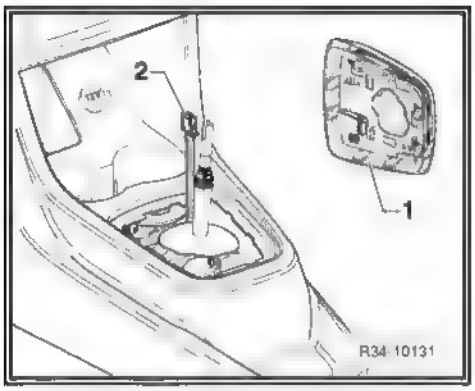
Note

A The gear indications on the selector lever -Y5- is integrated in the upper cover.

3.3.2 Installation

Install by inverting the removal sequence, paying attention to the following:

- Push on connector -2- to the upper cover -1- and position the harness from the right side, as indicated.
- Adjust the selector level bellows ⇒ page 29 .



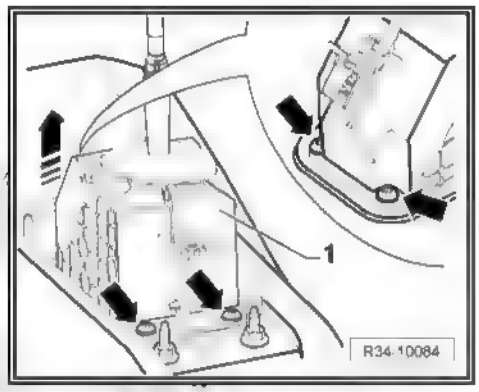
Note

After installation, check the operating positions of the selector lever ⇒ page 30 .

3.4 Selector lever - remove and install

3.4.1 Removal

- Remove the selector lever handle ⇒ page 25 .
- Remove the upper selector lever cover ⇒ page 26 .
- Remove the centre console ⇒ Body - internal mountings; Rep. Gr. 68 ; Internal equipment .
- Disconnect the connector from selector lever.
- Loosen the fastening screws -arrow-.
- Carefully detach and remove the selector lever -1- in the direction of the -arrow-.



3.4.2 Installation

Install by inverting the removal sequence, paying attention to the following:

- Install the selector lever and tighten the fastening screws with a torque of ⇒ Item 2 (page 25) .
- Install the centre console ⇒ Body - internal mountings; Rep. Gr. 68 ; Internal equipment .
- Install the upper selector lever cover ⇒ page 26 .
- Adjust the selector level bellows ⇒ page 29 .

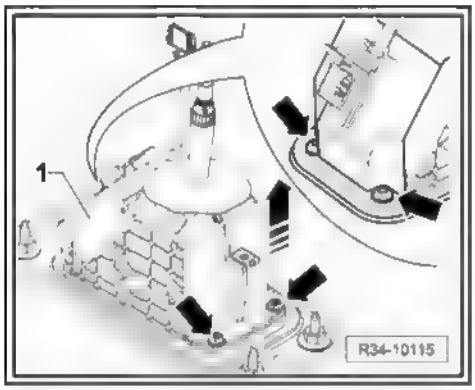
Note

After installation, check the operating positions of the selector lever ⇒ page 30 .

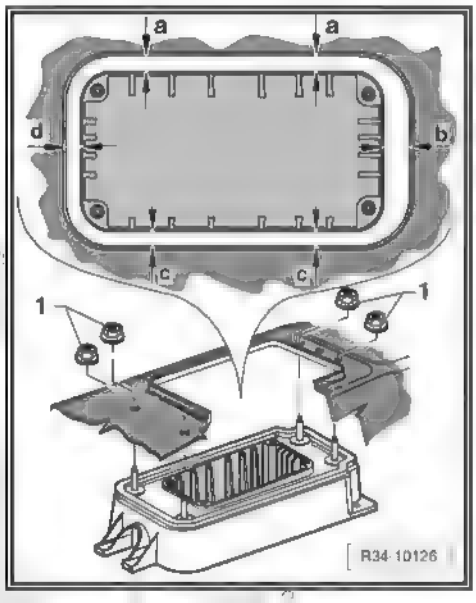
3.5 Lower selector lever cover - remove and install

3.5.1 Removal

- Remove the selector lever handle ⇒ page 25 .
- Remove the upper selector lever cover ⇒ page 26 .
- Remove the centre console ⇒ Body - internal mountings; Rep. Gr. 68 ; Internal equipment .
- Disconnect the connector from selector lever.
- Loosen the fastening screws -arrow- for the selector lever.
- Carefully detach and remove the selector lever -1- towards the arrow.
- Lift the vehicle.
- Remove the lower floor linings ⇒ Body - external mountings; Rep. Gr. 66 ; External equipment .
- Remove exhaust front pipe ⇒ Engine; Rep. Gr. 26 ; Exhaust system .
- Remove the heat deflector ⇒ Engine; Rep. Gr. 26 ; Exhaust system
- Lower vehicle.



- Inside the vehicle, measure and record position -a, b, c, d- measurements for the lower selector lever cover in relation to the vehicle's floor.
- Loosen the fastening nuts -1- and remove the lower selector lever cover from underneath the vehicle.



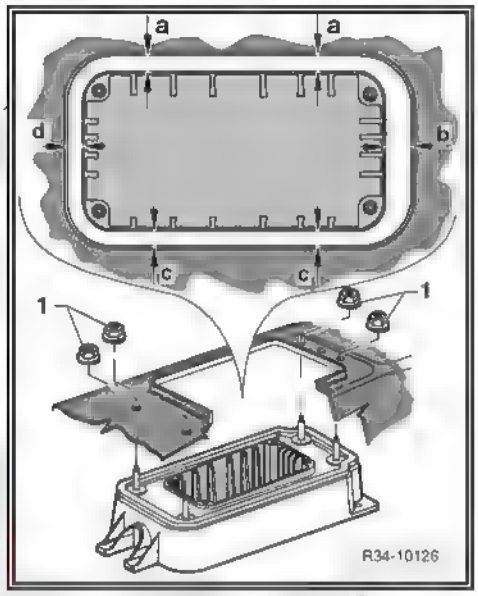
3.5.2 Installation

Install by inverting the removal sequence, paying attention to the following:

Position the lower cover according to measurements -a, b, c, d- recorded during removal.

.

- Tighten the fastening nuts -1- for the lower cover with a torque of ⇒ Item 3 (page 25) .
- Install selector lever ⇒ page 27 .
- Install the centre console ⇒ Body - internal mountings, Rep. Gr. 68 ; Internal equipment .
- Install the upper selector lever cover ⇒ page 26 .
- Adjust the selector level bellows ⇒ page 29 .

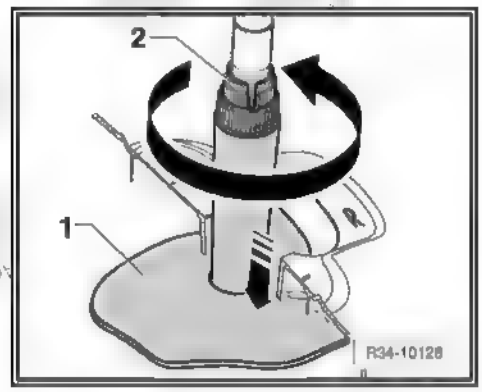


Note

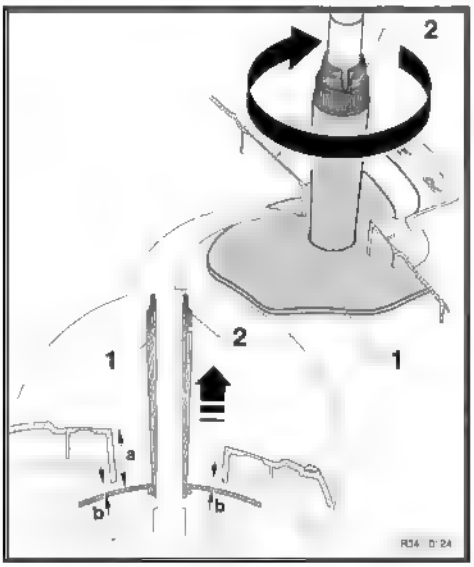
After installation, check the operating positions of the selector lever ⇒ page 30 .

3.6 Selection lever bellows - adjust

- Remove the selector lever handle ⇒ page 25 .
- Loosen the adjustment ring -2- towards the arrow.
- Move the bellows -1- towards the arrow.



- Adjust bellows -1- towards the arrow, until obtaining the measure -nd- with 22.5 mm.



Note

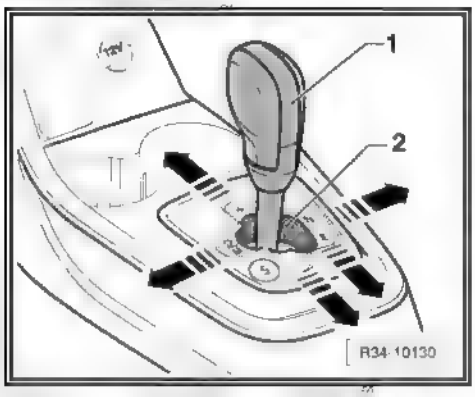
Measurement -b- represents the gap between the bellows and the upper cover which should be 2 mm.

- Lock the adjustment ring -2- in the direction of the -arrow-.

Note

After installation, check the operating positions of the selector lever ⇒ page 30 .

3.7 Selector lever operating positions - check



Selection lever positions

Move the selector lever -1- to all its positions indicated by the (arrow) and test the positions:

"D/M and N" check the gaps between the lever and the side of the upper cover -2-

"+ e -" check the gaps between the lever and the side of the upper cover -2-

"R" check the gaps between the lever and the side of the upper cover -2-

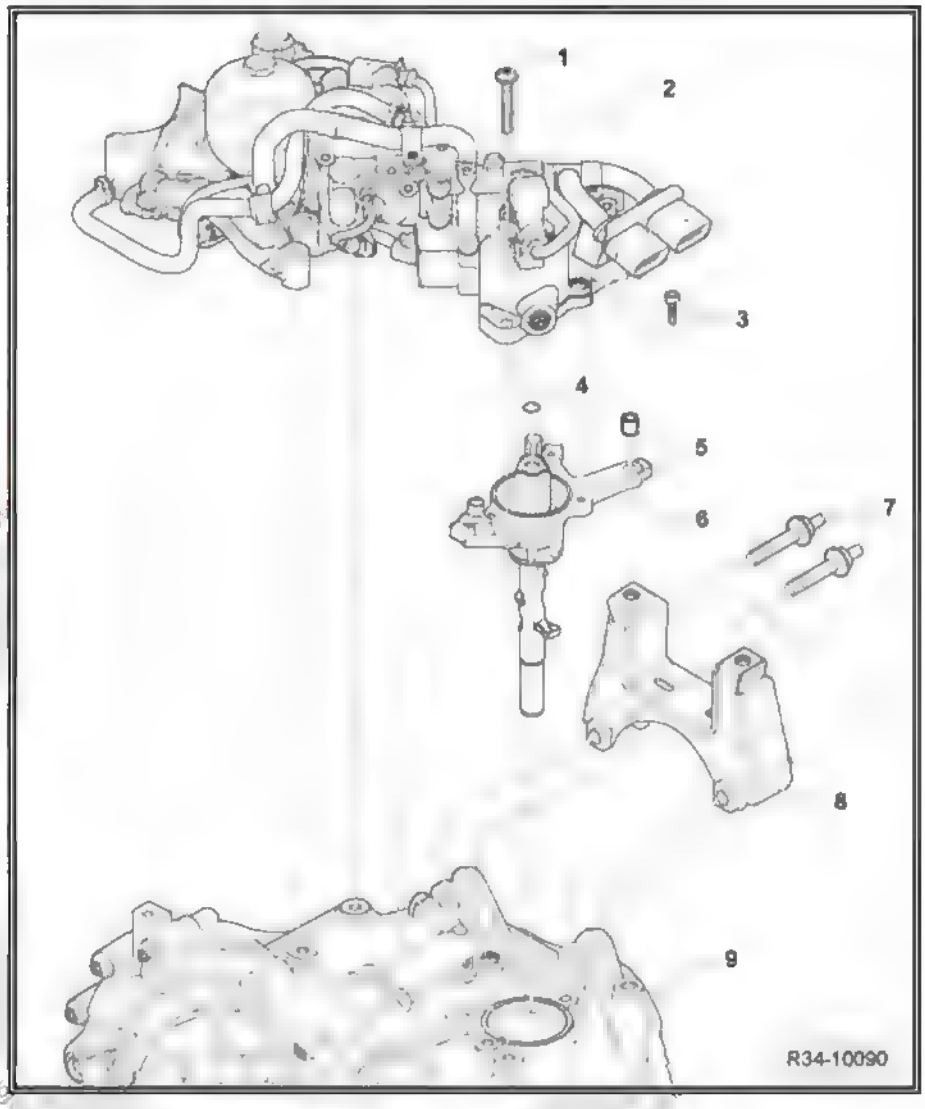
WARNING

These gaps should be divided. Otherwise it is necessary to adjust the gap between the selector lever and the upper cover, loosening the lower cover screws *⇒ page 29* *.*

It is important to maintain the alignment between the lower and upper covers to avoid interference or friction with the selector lever.

4 Gear selection mechanism - remove and install

4.1 Gear selection mechanism - assembly overview



1 - Screw
- ❑ 6 units
- ❑ 25 Nm + 45°.
- ❑ Replace whenever removed.

2 - Gear selection mechanism - adjust
- ❑ Remove and install ⇒ page 32 .
- ❑ Disassemble and assemble ⇒ page 39 .

3 - Screw
- ❑ 3 units.
- ❑ 8.5 ± 0.1 Nm
- ❑ Fastening for the selector axle set.

4 - Sealing ring (O-ring)
- ❑ Replace.
- ❑ Apply a thin layer of Grease , consult the ⇒ Chemical Materials Manual .

5 - Bushing

6 - Selector axle set
- ❑ Apply the Sealing putty - AMV 188 200 03 evenly on the sealing surface.

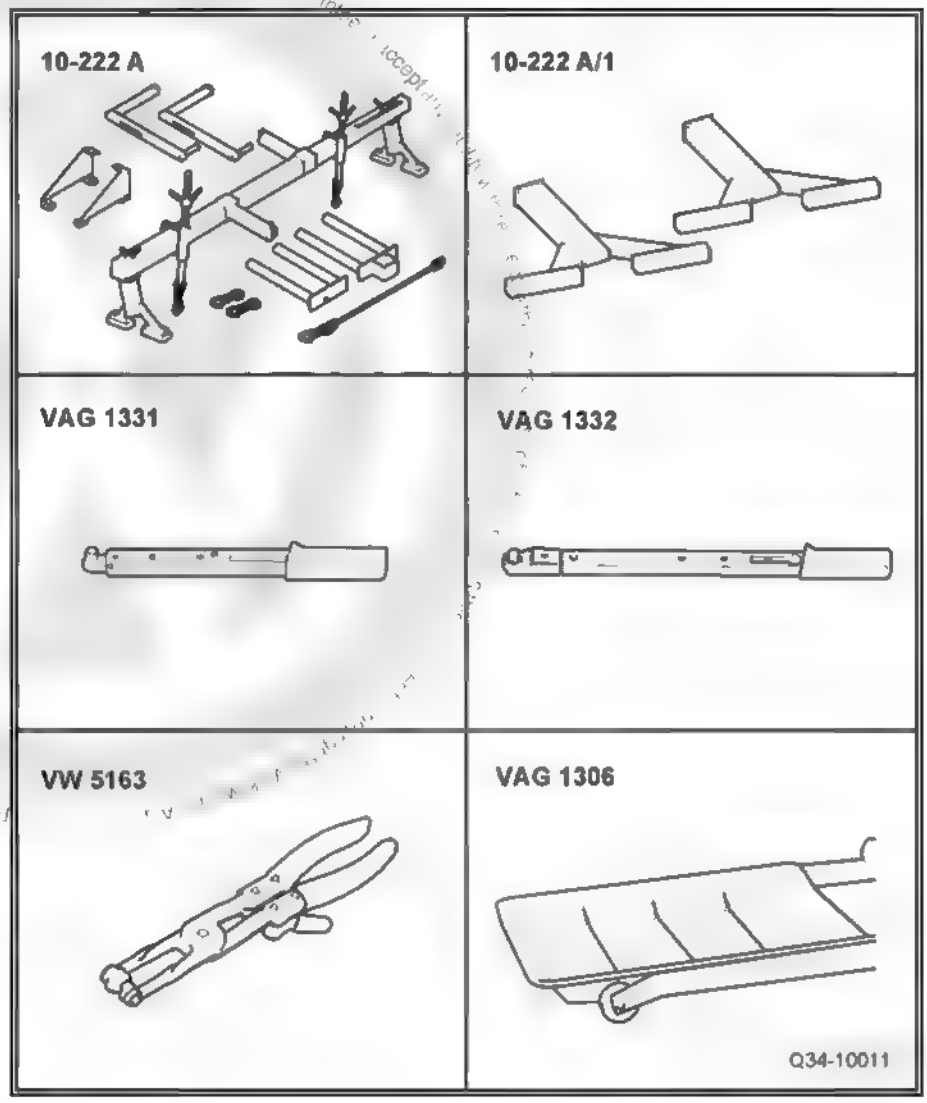
7 - Screw
- ❑ 2 units.
- ❑ 40 Nm + 90°.
- ❑ Replace whenever removed.

8 - Console

9 - Gearbox
- ❑ Remove and install ⇒ page 52 .

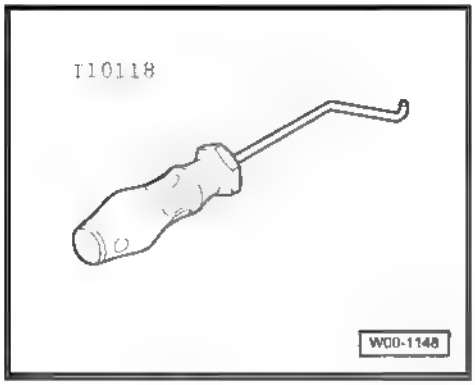
4.2 Gear selection mechanism - remove and install

- Bracket or VW 061 -10-222A-
- Bracket -10-222 A/1-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- Torquemeter - 40 to 200 Nm (socket 1/2") -VAG 1332-
- Space-Saver clamp pliers - VW 5163-
- Drip tray -VAG 1306-

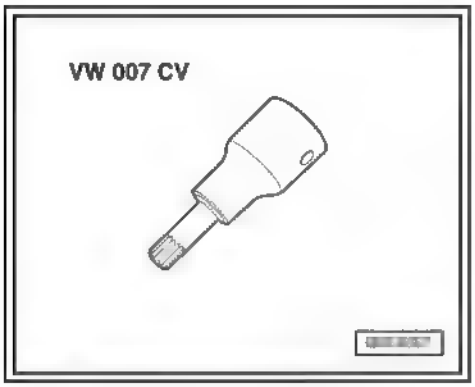


Special tools and workshop equipment required

- Hook -T10118-



- Multi-teeth socket M8 (enc.1/2") -VW 007CV-



4.2.1 Removal

Caution

Before working on the hydraulic system, it is necessary to depressurize the system.

To depressurize the hydraulic system, use the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- .

- Operate the parking brake.
- Place selector lever in position "N".
- Turn vehicle on.
- Connect the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ page 16 .
- Connect the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- and select the operation mode `Guided functions` and then the following menu functions:

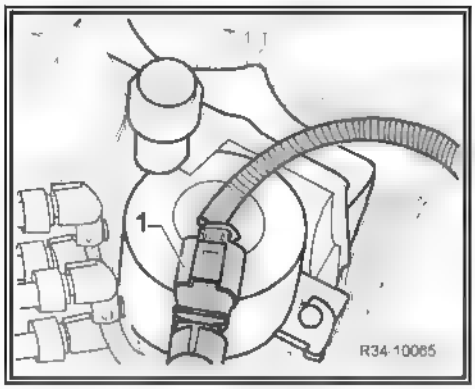
- Select:
- `Model`
- `Year`
- `Body`
- `Engine`
- `ASG automated transmission`
- `Relieve the hydraulic system pressure`

WARNING

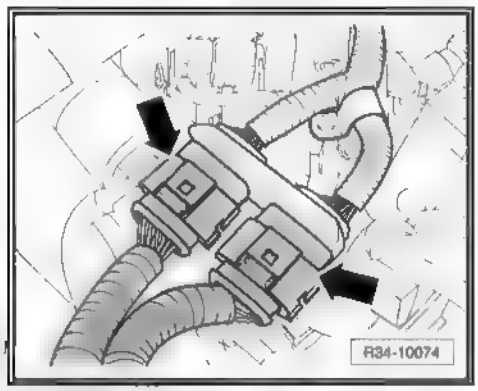
After depressurizing the hydraulic system, it is necessary to await approximately 1 minute before turning off the ignition.

- Disconnect the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .

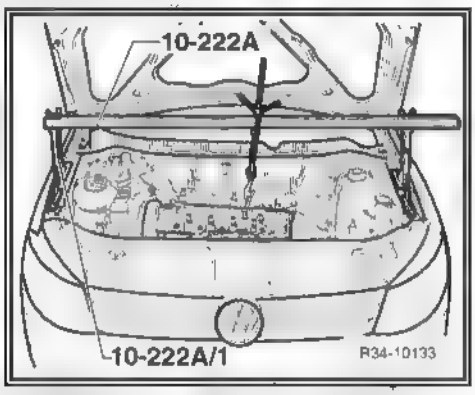
- Remove the air filter, it is installed behind the Battery -A- ⇒ Engine, Rep. Gr. 24 ; Fuel supply - injection system .
- Remove the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr 27 ; Starter, alternator, battery .
- Pull off connector -1- of the electric engine supply from Hydraulic transmission pump -V387- .



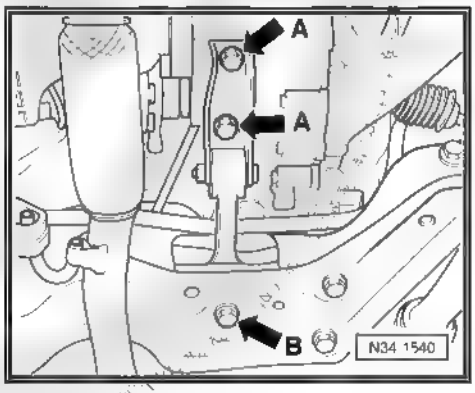
- Pull off connectors -arrows-.



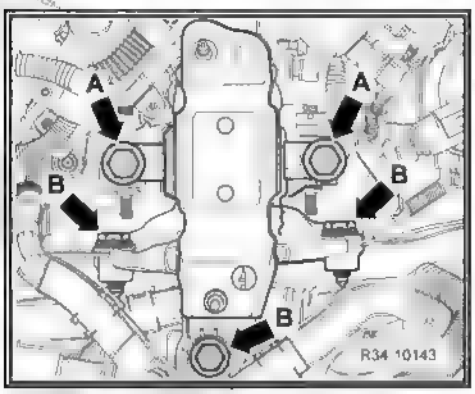
- Install the Bracket or VW 061 -10-222A- with Bracket -10-222 A/1- and sustain slightly the engine/transmission.
- Relieve the engine/transmission assembly weight through the fuse.
- Lift the vehicle.



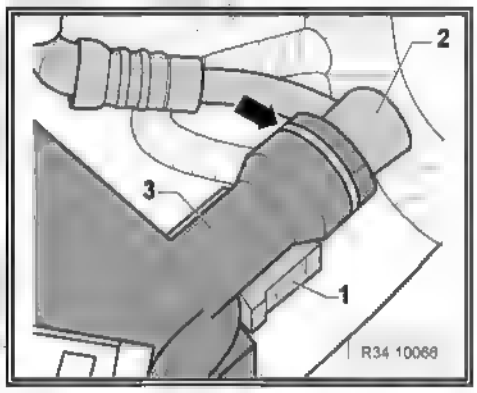
- Loosen the fastening screws -arrows A- and -arrow B- of the pendulum support.
- Remove the pendulum support
- Lower vehicle.



– Loosen the fastening screws -arrows A- on the transmission support.
– Carefully tilt the engine/transmission assembly. To do that, turn the screw on the Bracket or VW 061 -10-222A- approximately 55 mm downwards.
– Loosen the fastening screws -arrows B- and remove the transmission support.



– Pull off connector -1- of Clutch position sensor -G476- .
– Detach the lock -arrow- and remove the high-pressure connection tube -2- from the slave cylinder -3-.

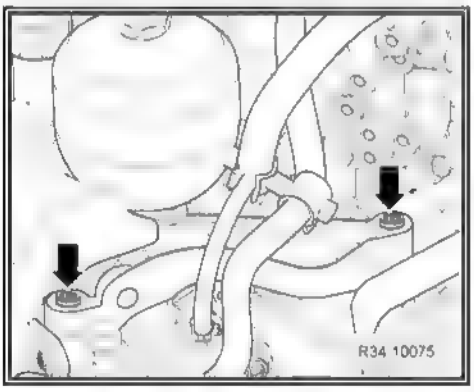


WARNING

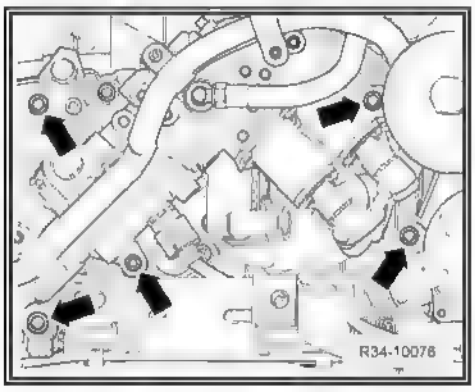
Cleaning is necessary to avoid any contamination inside the slave cylinder or the high-pressure tube.

Since it can damage the hydraulic system ⇒ page 6 .

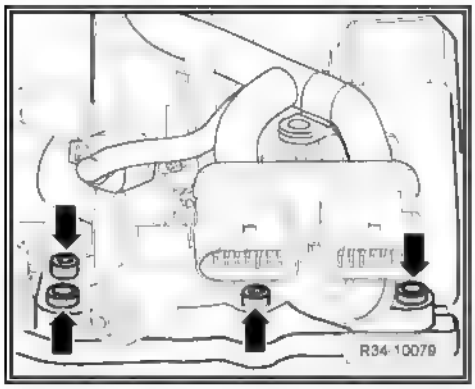
– Loosen the fastening screws -arrows- on the gear selection mechanism.



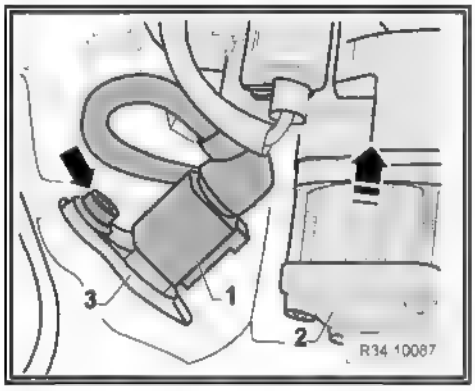
– Loosen the fastening screws -arrows- on the gear selection mechanism.



– Loosen the fastening screws -arrows- for the phalange and the selector axle set.
– Lift the vehicle.



– Pull off connector -1- of Transmission rotation sensor -G182- . To facilitate operation, use the Hook -T10118- and slightly move the gear selection mechanism set -2- upwards.
– Lower vehicle.
– Detach the gear selector mechanism from the selector axle set, removing it from above.



Note

Do not remove the transmission selector axle set
⇒ Item 6 (page 31) .

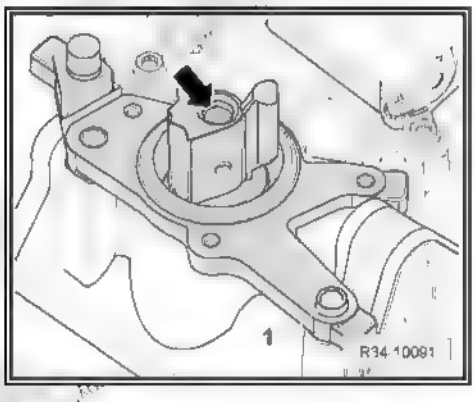
4.2.2 Installation

Install by inverting the removal sequence, paying attention to the following:

WARNING

Always replace self-locking nuts and bolts which were subjected to angular torque.

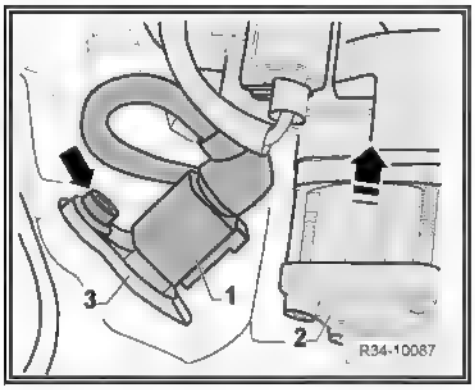
– Replace the sealing ring on the selector axle set ⇒ Item 4 (page 31) .
– Position the bushing -1- so that it is possible to fit the gear selection mechanism.
– Apply a thin layer of Grease -G 052 142 A2- -arrow-, consult the ⇒ Chemical Materials Manual on the sealing ring (o-ring).



– Install the gear selection mechanism and connect the -1- of Transmission rotation sensor -G182- .

– Install the fastening screws for the gear selection mechanism and tighten to a torque of ➔ Item 1 (page 31) .

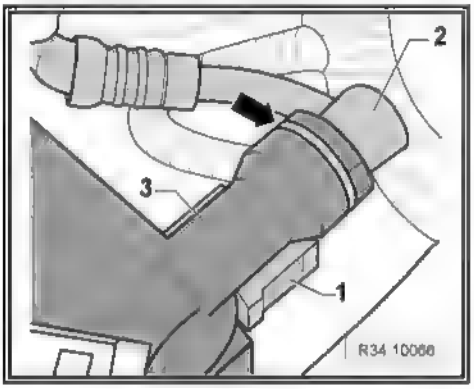
– Install the fastening screws for the selector axle set and tighten to a torque of ➔ Item 3 (page 31) .



WARNING

- *Cleaning is necessary near the cylinder opening and the tube to avoid any kind of contamination (dust, residues, etc). Pay attention to the general repair instructions.*
- *Observe the general repair instructions ⇒ page 6 .*

– Fit the high-pressure connection tube -2- onto the slave cylinder -3- until it clicks and attaches.



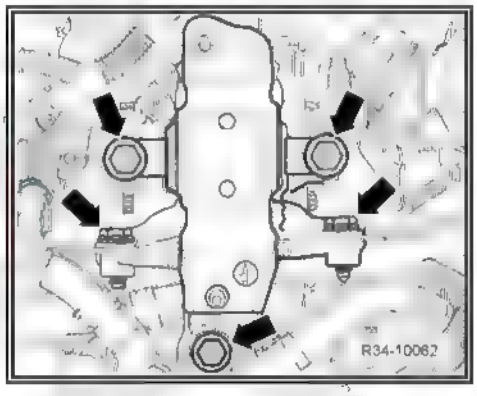
WARNING

The tubing connection -2- should be properly connected to the slave cylinder -3-. If this does not occur, hydraulic oil will leak at high-pressure.

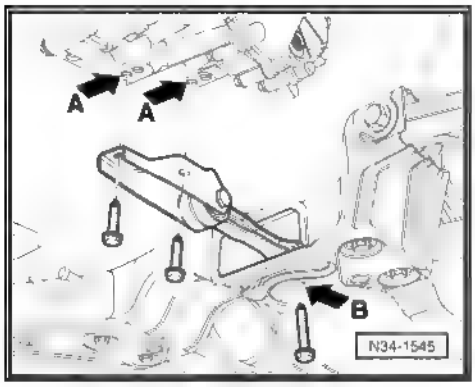
– Push on connector -1- of Clutch position sensor -G476- .

– Install the transmission support and tighten the fastening screws -arrows-. Tightening torques, refer to ⇒ page 60 .

– Lift the vehicle.



- Install pendulum support -arrows A- and -arrows B-. Tightening torques, refer to ⇒ page 60 .
- Lower vehicle.
- Install the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Install the air filter, it is installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .
- Connect the Battery -A- ⇒ Electrical equipment, Rep. Gr. 27 ; Starter, alternator, battery .



Note

After installation, use the Diagnosis, Measurement and Information System , to perform basic adjustments.

- Elevate the vehicle approximately 30 cm from the ground.
- Operate the parking brake.
- Activate the break pedal.
- Place the selector lever in position "N".
- Turn the vehicle on.

WARNING

Place selector lever in position "R" until it clicks and attaches the gear mechanism axle with the selector axle ⇒ Item 6 (page 31).

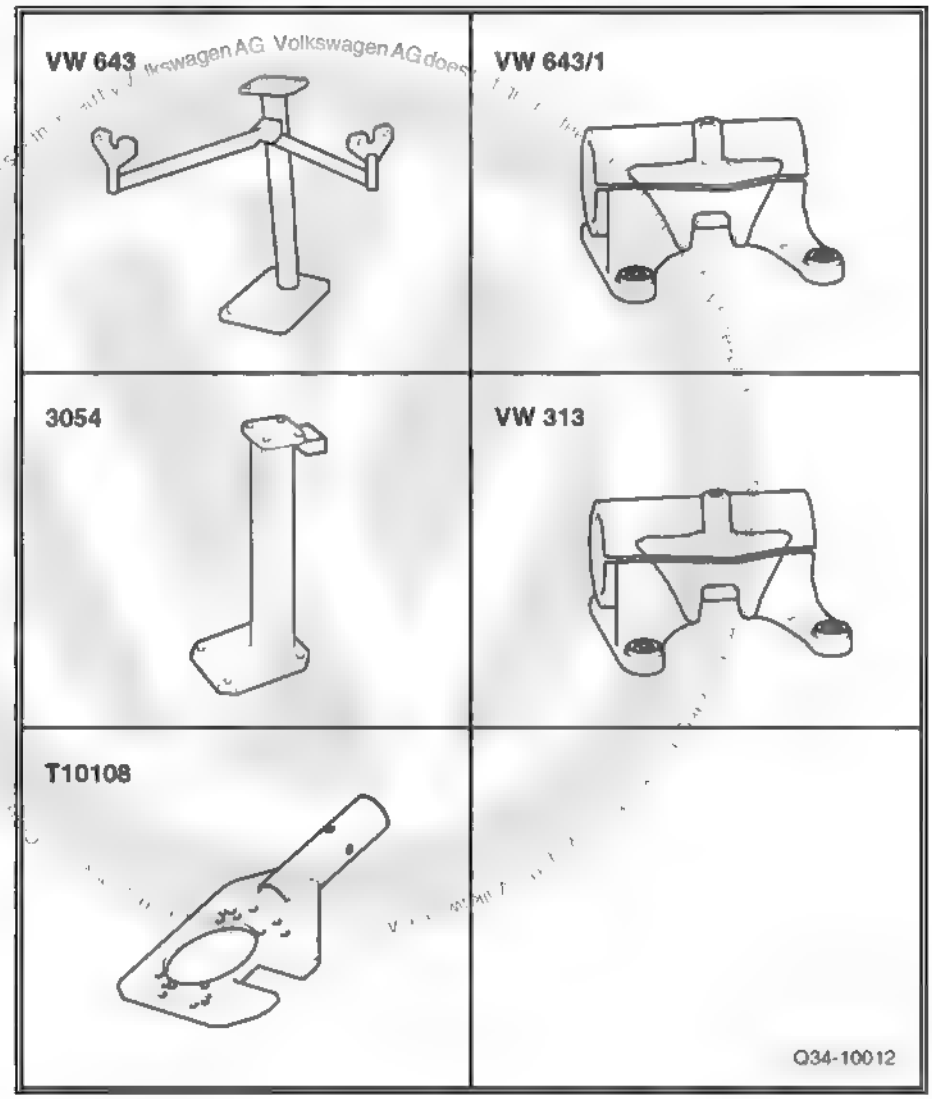
- Place the selector lever in position "N".
- Stop the engine.
- Turn vehicle on.
- Connect the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ page 16 .
- Connect the Vehicle diagnosis, measurement and information system and select the operation mode Guided functions and then the following menu functions:

- Select:
- Model
- Year
- Body
- Engine
- ASG automated transmission
- Basic adjustment of the initial clutch position
- Basic adjustment of the initial gearshift lever

5 Gear selection mechanism - disassemble and assemble

Special tools and workshop equipment required

- Support for fastening the sub-frame -VW 643-
- Support for VW643 -VW 643/1-
- Support -3054-
- Support for 3054 -VW 313-
- Gearbox support -T10108-

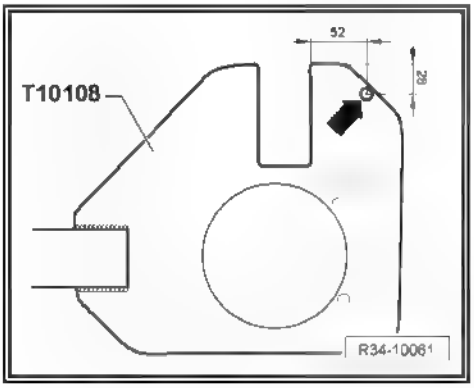


Modify the support for the Gearbox support -T10108- :

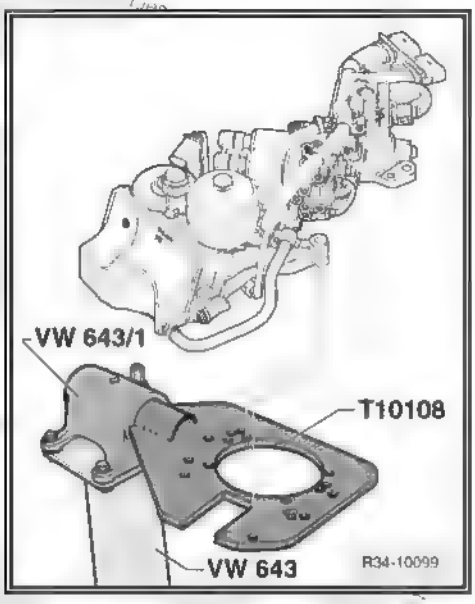
A new hole is required to fasten the automated transmission (ASG) 0C3 to the transmission support.

Measures in mm:

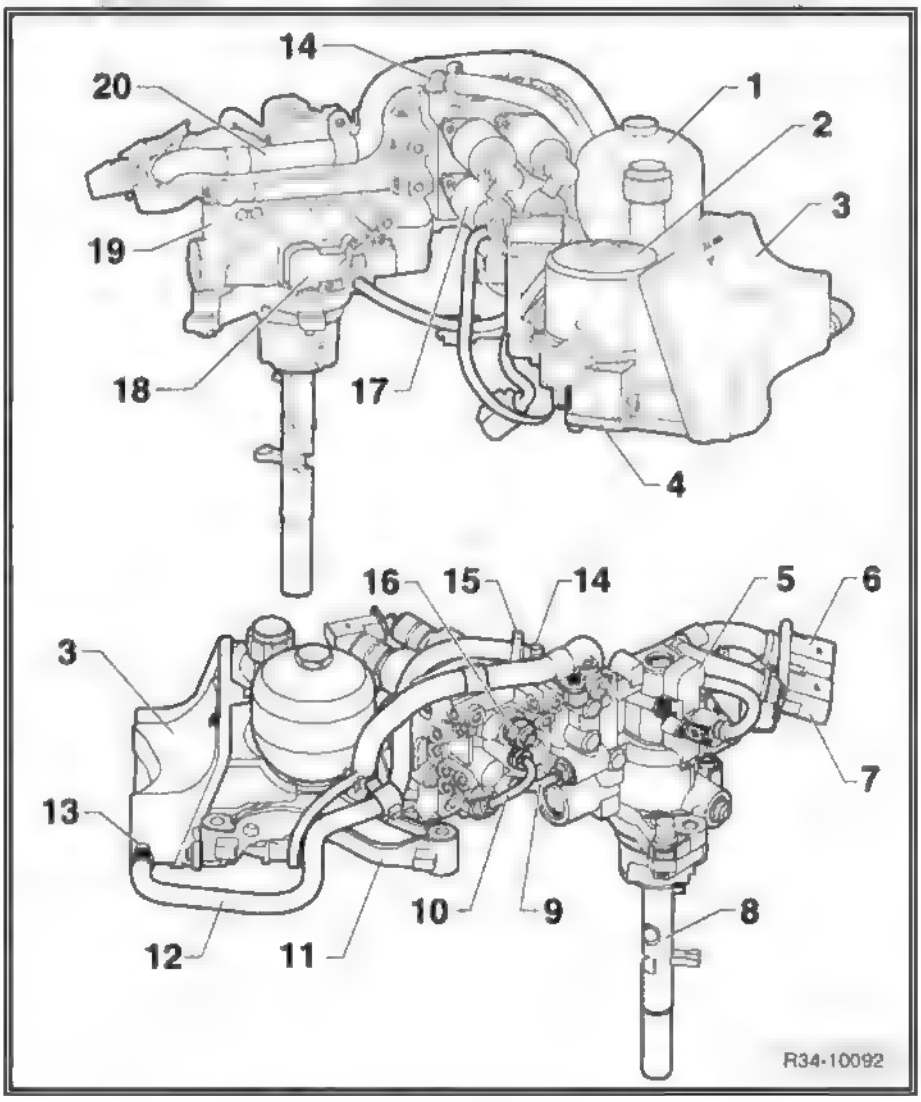
– Make a hole of ∅11.0 mm -arrow- on the Gearbox support -T10108- .



To facilitate the disassembly and assembly operations for the gear selector mechanism, use the Gearbox support -T10108- as indicated:



5.1 Gear selection mechanism - assembly overview



1 - Pressure accumulator
- ❑ 90 ± 9 Nm.
- ❑ Replace the sealing ring (o-ring) .

2 - Electric motor for the Hydraulic transmission pump -V387-
- ❑ Remove and install ⇒ page 46 .
- ❑ Apply the Nyogel -G. 052.817.A1- to the contact pins.

3 - Hydraulic oil reservoir
- ❑ Remove and install ⇒ page 48 .
- ❑ Oil specification for gear selector mechanism ⇒ page 1 .

4 - Hydraulic transmission pump -V387-
- ❑ Remove and install ⇒ page 47 .

5 - Gear identification sensor -G604-
- ❑ Apply the Nyogel -G 052.817.A1- to the contact pins.
- ❑ Locate, remove and install › page 20 .
- ❑ Check with the Diagnosis, Measurement and Information System - VAS 5051- or Diagnosis, Measurement and Information System - VAS 5052- › Vehicle diagnosis, testing and information system VAS 5051.

6 - 14-pin connector -T14- "Brown"
- ❑ Apply the Nyogel -G 052.817.A1- to the contact pins.
- ❑ Connector occupation ⇒ page 42 .

7 - 14-pin connector -T14- "Black"
- ❑ Apply the Nyogel -G 052.817.A1- to the contact pins.
- ❑ Connector occupation ⇒ page 42 .

8 - Selector axle set

9 - High-pressure slave cylinder
- ❑ Remove and install ⇒ page 44 .

10 - Pressure tube
- ❑ Remove and install ⇒ page 45 .

11 - Hydraulic set
- ❑ "Power Pack"
- ❑ Remove and install ⇒ page 31 .

12 - Return hose
- ❑ Remove and install ⇒ page 49 .

13 - Clamp
- ❑ For the reservoir side.

14 - Oil return connector

> ⚠ WARNING
> *Handle with care!*

15 - Clamp
- ❑ For the actuator side.

16 - Maximum pressure valve
- ❑ Remove and install ⇒ page 45 .

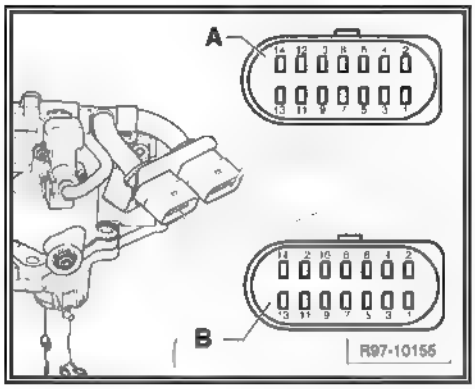
17 - Valve set (electronic valves)
- ❑ Remove and install ⇒ page 43 .

18 - Gear identification sensor 2 -G616-
- ❑ Apply the Nyogel -G.052.817.A1- to the contact pins.
- ❑ Locate, remove and install ⇒ page 22 .
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

19 - Gear selection mechanism - adjust
- ❑ Remove and install ⇒ page 31 .

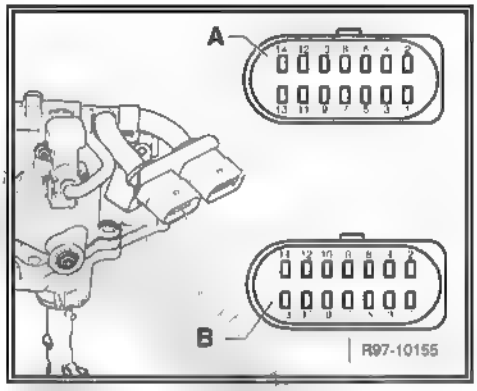
20 - Wiring harness / connector bracket
- ❑ Wiring harness - remove and install ⇒ page 49 .
- ❑ Connector bracket - remove and install ⇒ page 51 .

Multiple connector A occupation, 14-pin connector -T14- "Brown" :



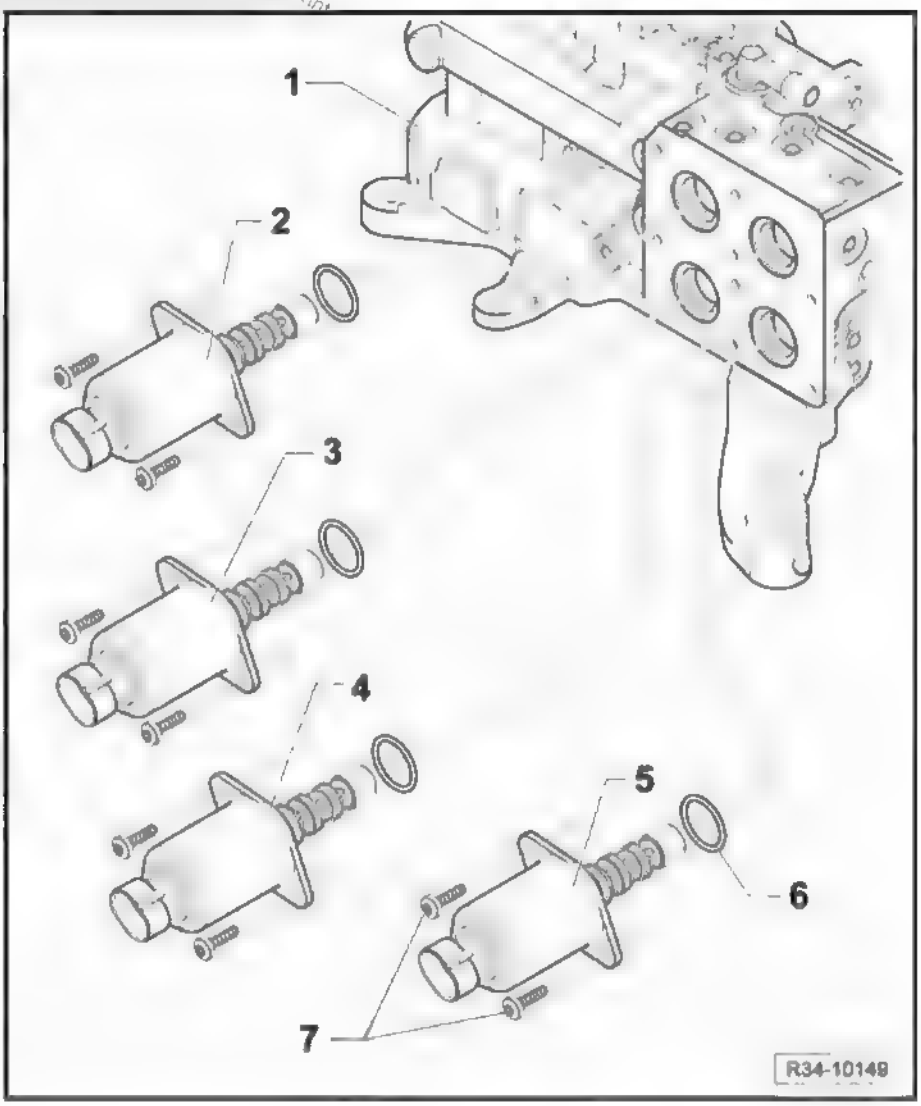
1 - Transmission rotation sensor -G182- - 1
2 - Transmission rotation sensor -G182- - 2
3 - Gear identification sensor 2 -G616- - 2
4 - Gear identification sensor 2 -G616- - 4
5 - Gear identification sensor 2 -G616- - 3
6 - Gear identification sensor 2 -G616- - 1
7 - Gear identification sensor -G604- - 2
8 - Gear identification sensor -G604- - 4
9 - Gear identification sensor -G604- - 3
10 - Gear identification sensor -G604- -1
11 - Power supply (5V)
12 - Sensor ground wire (-)
13 - Transmission hydraulic pressure sensor -G270-
14 - Clutch position sensor -G476-

Multiple connector B occupation, 14-pin connector -T14- "Black" :



1 - Gear selection valve 1 -N284-
2 - Valve ground wire (-)
3 - Gear selection valve 2 -N285-
4 - Valve ground wire (-)
5 - Gear selection valve 3 -N286-
6 - Valve ground wire (-)
7 - Clutch actuator valve -N255-
8 - Valve ground wire (-)
9 - Not used
10 - Not used
11 - Power supply (5V)
12 - Sensor ground wire (-)
13 - Clutch position sensor -G476- - 2
14 - Clutch position sensor -G476- - 1

5.2 Valve set - assembly overview



1 - Gear selection mechanism - adjust
- ❑ "Actuator Pack".
- ❑ Remove and install ⇒ page 31 .

2 - Gear selection valve 1 - N284- "EV1"
- ❑ Remove and install ⇒ page 44 .
- ❑ Apply the Nyogel -G. 052.817.A1- to the contact pins.
- ❑ Check with the Diagnosis, Measurement and Information System - VAS 5051- or Diagnosis, Measurement and Information System - VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

3 - Gear selection valve 2 - N285- "EV2"
- ❑ Remove and install ⇒ page 44 .
- ❑ Apply the Nyogel -G. 052.817.A1- to the contact pins.
- ❑ Check with the Diagnosis, Measurement and Information System - VAS 5051- or Diagnosis, Measurement and Information System - VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

4 - Clutch actuator valve -N255- "EV0"
- ❑ Remove and install ⇒ page 44 .
- ❑ Apply the Nyogel -G.052.817.A1- to the contact pins.
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051.

5 - Gear selection valve 3 -N286- "EV3"
- ❑ Remove and install ⇒ page 44 .
- ❑ Apply the Nyogel -G 052.817.A1- to the contact pins.
- ❑ Check with the Diagnosis, Measurement and Information System -VAS 5051- or Diagnosis, Measurement and Information System -VAS 5052- ⇒ Vehicle diagnosis, testing and information system VAS 5051

6 - O-rings
- ❑ At each removal, replace it
- ❑ 4 units

7 - Screw
- ❑ 8 units
- ❑ 3.6 ± 0 6 Nm.

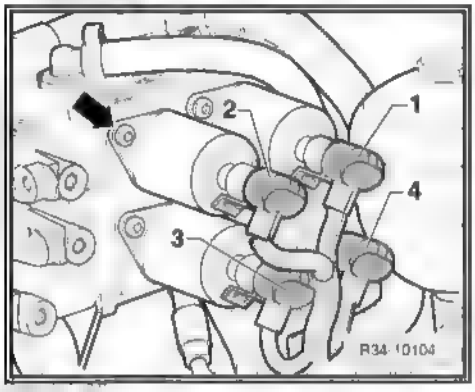
5.3 Valve set - remove and install

Removal:

- Remove the gear selection mechanism ⇒ page 31 .
- Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .
- Drain the hydraulic oil from the reservoir.

> **WARNING**
>
> *Before disconnecting the connectors from the valves, mark their respective positions. Observe the valve connectors "EV0" and "EV3", they have a yellow identification tape*

Mark the position of the connectors to their respective valves.

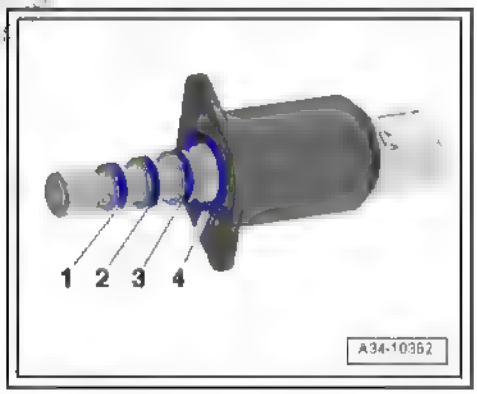


- Connector -1- from the Clutch actuator valve -N255- "EV0" indicated with YELLOW TAPE
- Connector -2- from the Gear selection valve 1 -N284- "EV1"
- Connector -3- from the Gear selection valve 2 -N285- "EV2"
- Connector -4- from the Gear selection valve 3 -N286- "EV3" indicated with YELLOW TAPE
- Loosen the fastening screws and remove the valves.

Installation:

Install by inverting the removal sequence, paying attention to the following:

- Check and replace the O-rings if necessary for Gear selection valve 1 -N284- , Clutch actuator valve -N255- , Gear selection valve 2 -N285- and Gear selection valve 3 -N286- .



1 - Black O-ring

2 - Green O-ring

3 - Black O-ring

4 - Green O-ring

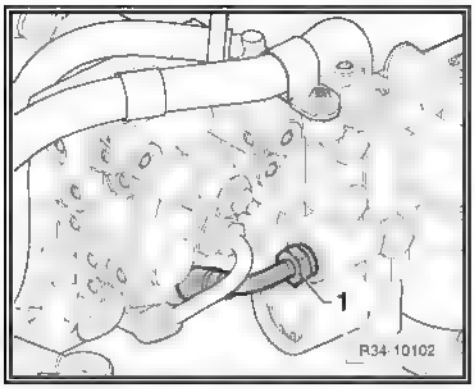
- Tighten fastening screws for the valves with a torque of ⇒ page 51 .

5.4 Slave cylinder high-pressure tube - remove and install

Removal:

- Remove the gear selection mechanism ⇒ page 31 .
- Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .
- Drain the hydraulic oil from the reservoir.

– Loosen the hexagonal connection of the high-pressure tube -1- with the 1/2 " (inch) wrench



Installation:

Install by inverting the removal sequence, paying attention to the following:

– Tighten the hexagonal connection -1- for the high-pressure tube with a torque of ➢ page 51 .

5.5 Pressure tube - remove and install

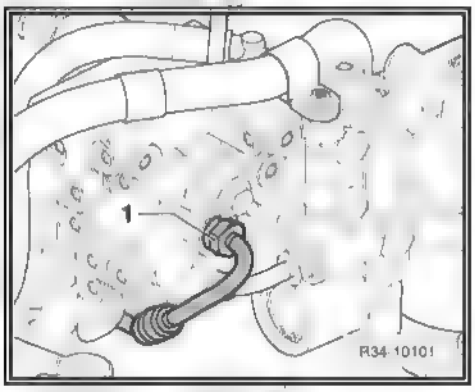
Removal:

– Remove the gear selection mechanism ⇒ page 31 .

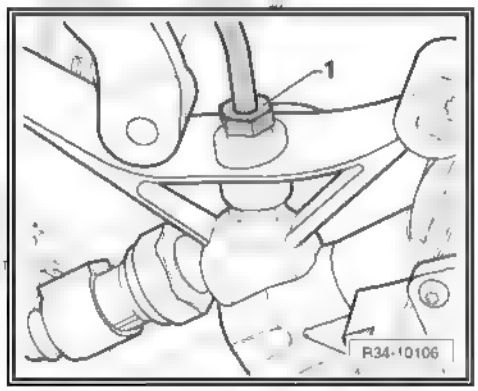
– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .

– Drain the hydraulic oil from the reservoir.

– Loosen the hexagonal connection of the high-pressure tube -1- with the 1/2 " (inch) wrench.



– Loosen the hexagonal connection of the high-pressure tube -1- with the 1/2 " (inch) wrench.



Installation:

Install by inverting the removal sequence, paying attention to the following:

– Tighten the hexagonal connections -1- for the high-pressure tube with a torque of ⇒ page 51 .

5.6 Maximum pressure valve - remove and install

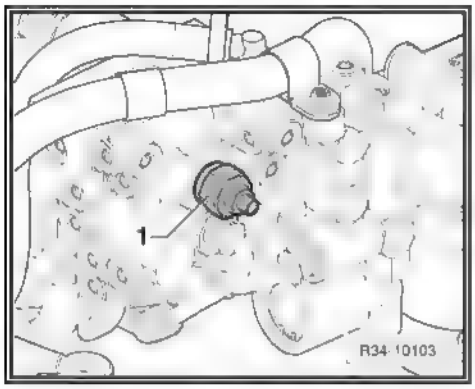
Removal:

– Remove the gear selection mechanism ➢ page 31 .

– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ➢ page 40 .

– Drain the hydraulic oil from the reservoir.

– Loosen the maximum pressure valve -1- with a 17 mm (millimeters) wrench.



Installation:

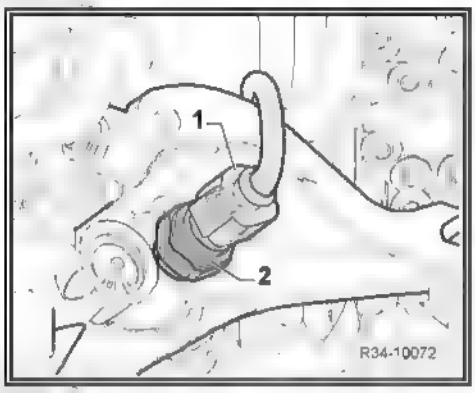
Install by inverting the removal sequence, paying attention to the following:

– Tighten the maximum pressure valve -1-, with a torque of ⇒ page 51 .

5.7 Transmission hydraulic pressure sensor -G270- - Remove and install

Removal:

– Remove the gear selection mechanism ⇒ page 31 .
– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .
– Drain the hydraulic oil from the reservoir.
– Pull off connector -1-.
– Release Transmission hydraulic pressure sensor -G270- -2-.



Installation:

Install by inverting the removal sequence, paying attention to the following:

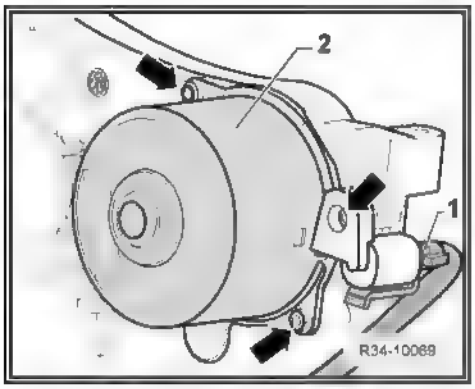
– Tighten the Transmission hydraulic pressure sensor -G270- -2-, with a torque of ⇒ page 51 .
– Apply the Nyogel -G.052.817.A1- on the contact pins for the Transmission hydraulic pressure sensor -G270- -2-.

5.8 Electric motor for the Hydraulic transmission pump -V387- - Remove and install

Removal:

– Remove the gear selection mechanism ⇒ page 31 .
– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .
– Drain the hydraulic oil from the reservoir.
– Remove the hydraulic oil reservoir ⇒ page 48 .

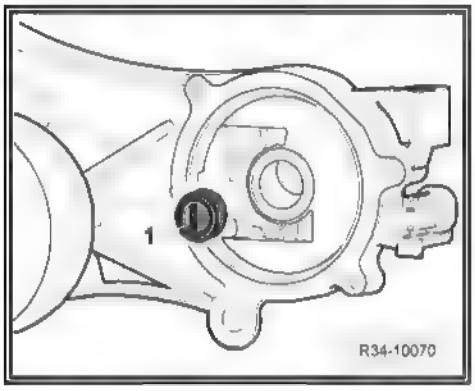
– Pull off connector -1-.
– Loosen the fastening screws -arrows- and remove the electric motor -2-.



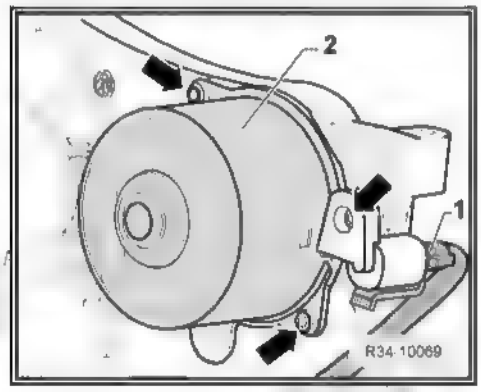
Installation:

Install by inverting the removal sequence, paying attention to the following:

– Position the coupling -1- on the axle of the Hydraulic transmission pump -V387- .



– Install the electric motor -2- and tighten the fastening screws with a torque of ⇒ page 51 .
– Apply the Nyogel -G.052.817.A1- to the connector contact pins -1-.

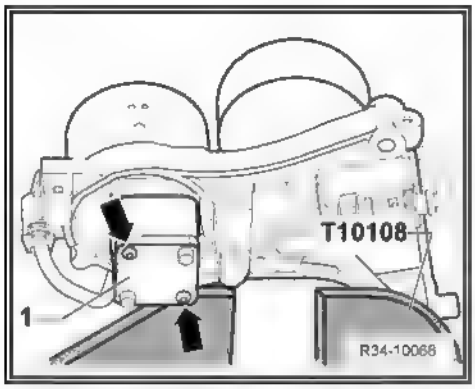


5.9 Hydraulic transmission pump -V387- - Remove and install

Removal:

– Remove the gear selection mechanism ⇒ page 31 .
– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .
– Drain the hydraulic oil from the reservoir.
– Remove the hydraulic oil reservoir ⇒ page 48 .

– Loosen the fastening screws -arrows-.
– Remove the Hydraulic transmission pump -V387- -1-.

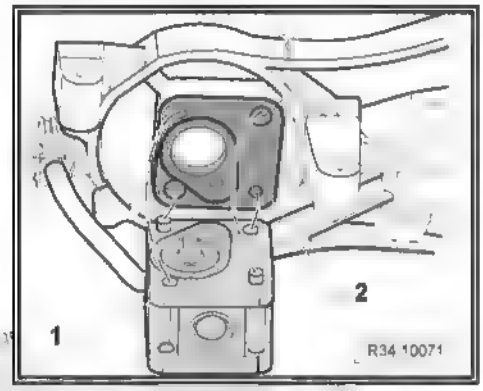


Installation:

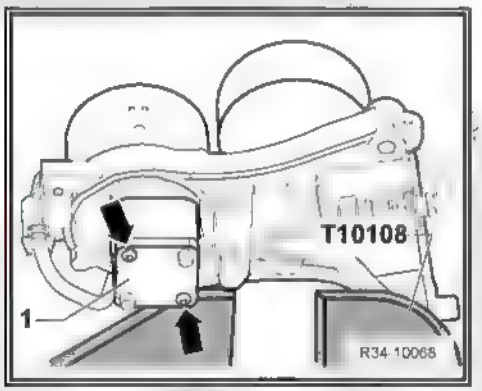
Install by inverting the removal sequence, paying attention to the following:

– Replace sealing rings.

– Install Hydraulic transmission pump -V387- on the case of hydraulic set -2-.



– Tighten the fastening screws -arrows- from the Hydraulic transmission pump -V387- -1- with torque ⇒ page 51 .



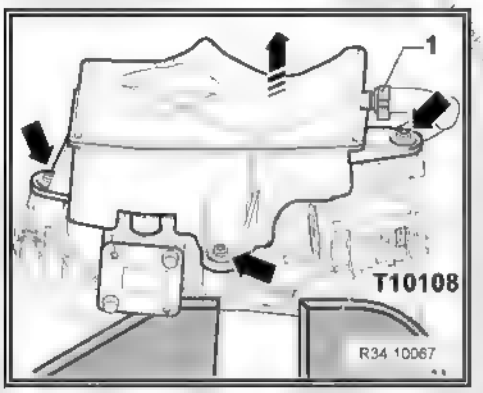
5.10 Hydraulic oil reservoir - remove and install

Removal:

– Remove the gear selection mechanism ⇒ page 31 .
– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .
– Drain the hydraulic oil from the reservoir.

– Remove clamp -1-.

– Loosen the fastening screws -arrows- and remove the hydraulic oil reservoir following the arrow.



Installation:

Install by inverting the removal sequence, paying attention to the following:

– Replace the reservoir sealing ring.

– Install the sealing ring onto the reservoir exit tube.

– Install the hydraulic oil reservoir and tighten the fastening screws with a torque of ⇒ page 51 .

– Replenish and check the hydraulic oil level ⇒ page 64 .

5.11 Return tube - remove and install

Removal:

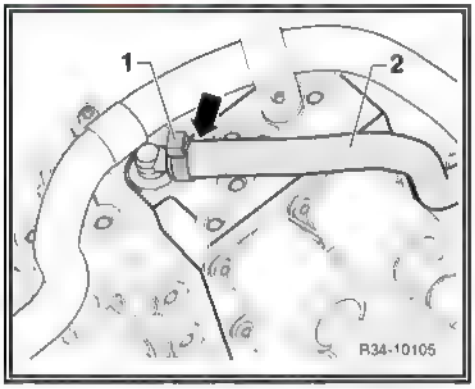
– Remove the gear selection mechanism ⇒ page 31 .

– Install the gear selection mechanism on the Gearbox support -T10108- as indicated ⇒ page 40 .

– Drain the hydraulic oil from the reservoir.

– Carefully remove clamp -1-.

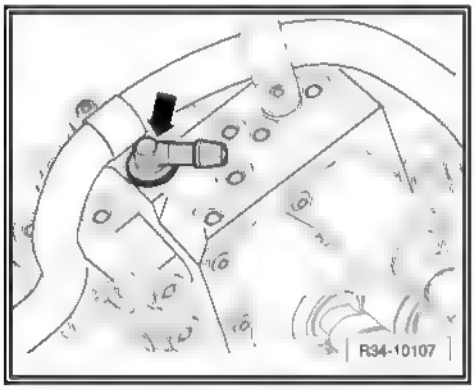
– Detach the return tube -2-. If necessary, cut the tube at the -arrow- to facilitate detachment.



> **WARNING**
>
> *Carefully remove the clamp and return tube so that the oil return connector -arrow- is not damaged. Otherwise the entire actuator set will have to be replaced "Actuator Pack".*

Installation:

Installation is carried out in the reverse order of removal.



5.12 Wiring harness - remove and install

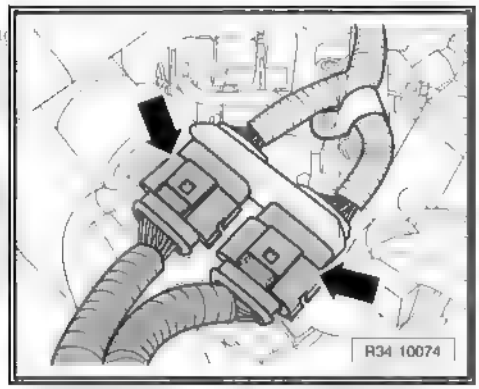
Removal:

– Disconnect the Battery -A- ⇒ Electrical equipment; Rep Gr. 27 ; Starter, alternator, battery .

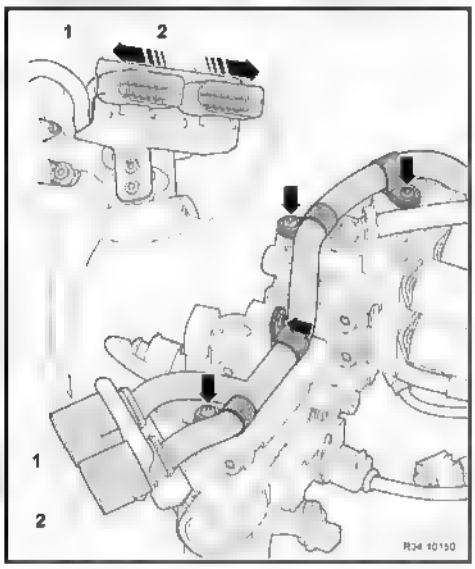
– Remove the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .

– Remove air filter installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .

- Remove the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Mark the position of the connectors to their respective valves ⇒ page 44 .
- Pull off connectors -arrows-.
- Disconnect the various connectors from the wiring harness.



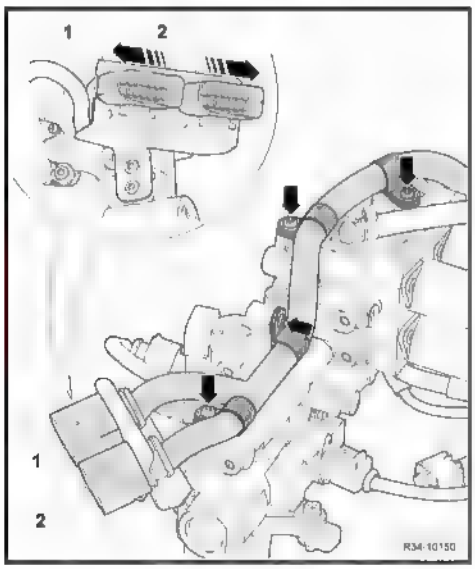
- Loosen the fastening screws -arrows-.
- Detach the connectors -1- and -2- from the support according the arrow.



Installation:

Install by inverting the removal sequence, paying attention to the following:

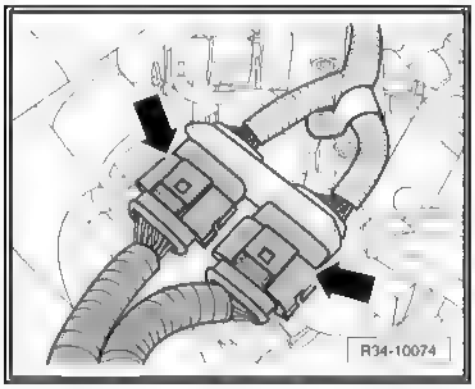
- Install the wiring harness and tighten the fastening screws -arrows- for the clamps with a torque of ⇒ page 51



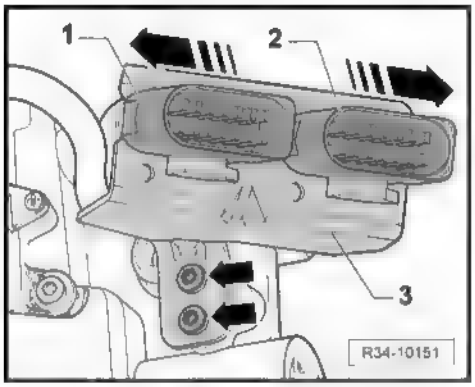
5.13 Connector bracket (wiring harness) - remove and install

Removal:

- Disconnect the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove air filter installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .
- Remove the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Pull off connectors -arrows-.



- Loosen the fastening screws -arrows- on the support -3-.
- Detach the connectors -1- and -2- towards the arrow and remove the support -3-.



Installation:

Install by inverting the removal sequence, paying attention to the following:

- Install support -3- and tighten the fastening screws -arrows- with torque ⇒ page 51 .

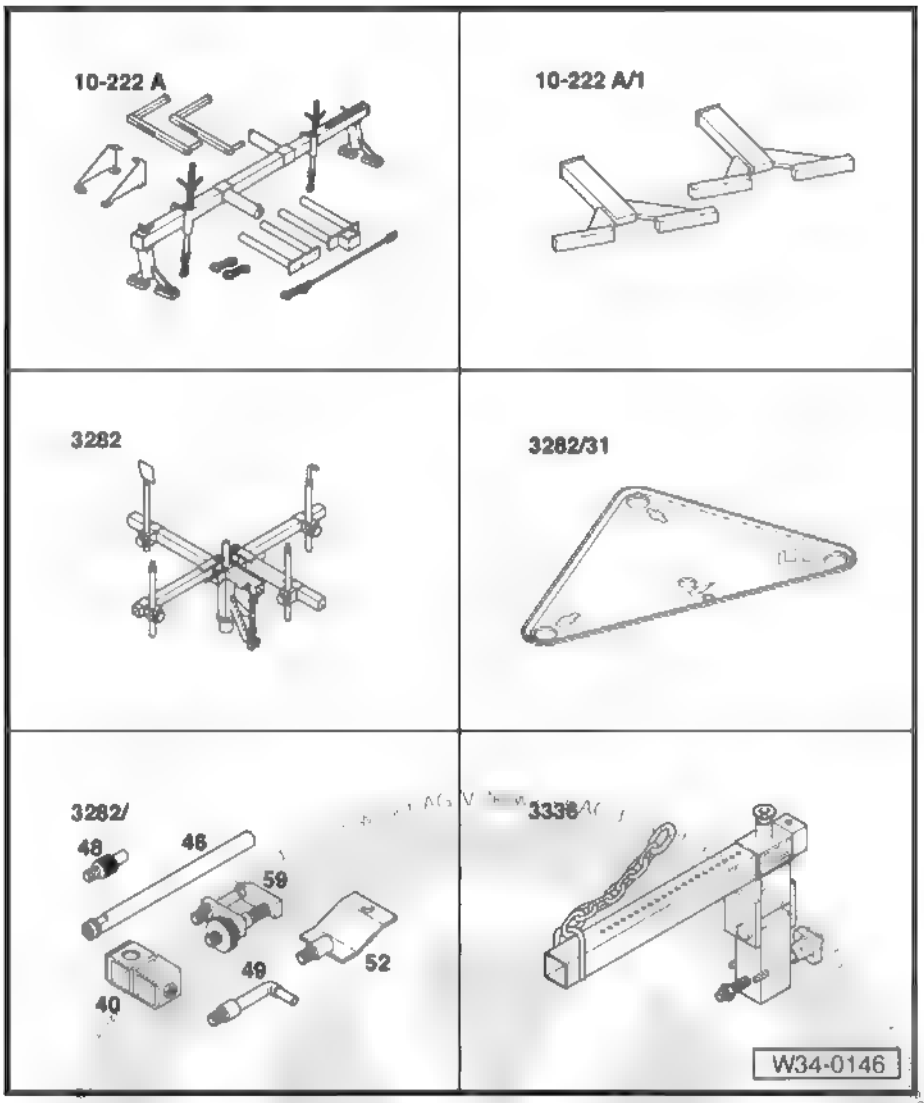
5.14 Tightening torque

Location	Tightening torque
Pressure accumulator	90 ± 9 Nm
Valve fastening screws	3.6 ± 0 6 Nm
Connection for the slave cylinder high-pressure tube	17 ± 1 Nm.
High-pressure tube connections	17 ± 1 Nm
Maximum pressure valve	40 ± 4 Nm
Transmission hydraulic pressure sensor -G270-	15 ± 1.5 Nm
Electric motor fastening screw	6 + 1 Nm
Hydraulic pump fastening screws	5.5 ± 1 Nm
Hydraulic reservoir fastening screws	3.6 + 1 Nm
Wiring harness fastening screws	3.6 ± 0.6 Nm
Fastening screws for the wiring harness support	3.6 ± 1 Nm

6 Transmission - remove and install

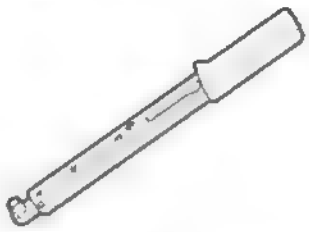
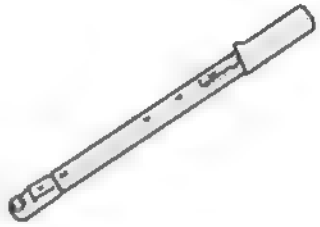
Special tools and workshop equipment required

- Bracket or VW 061 -10-222A-
- Bracket -10-222 A/1-
- Support -3282-
- Adjustment plate -3282/31-
- Pin -3282/48-
- Support -3282/59-
- Support -3336-



Special tools and workshop equipment required

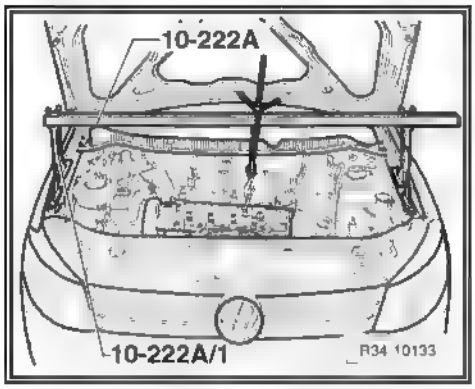
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- Torquemeter - 40 to 200 Nm (socket 1/2") -VAG 1332-
- Engine and gearbox jack + gearbox or EQ 7081 -VAG 1383A-

VAG 1331 	**VAG 1332** 
VAG 1383A 	
	Q34-10015

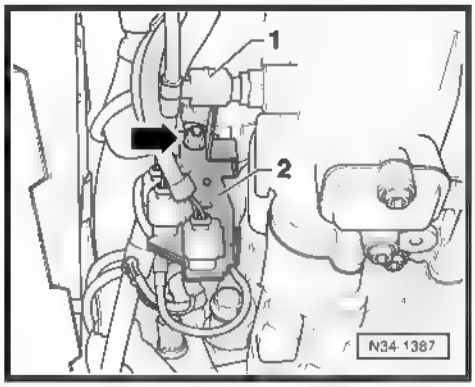
6.1 Removal

- Operate the parking brake.
- Turn vehicle on.
- Place selector lever in position "N".
- Remove the gear selection mechanism ⇒ page 31 .
- Remove earth strap from the upper fastening screw on the engine/transmission.
- Loosen upper screws fastening the engine to transmission.
- Loosen upper fastening screw on the Starter -B- .

- Relieve the engine/transmission assembly weight through the spindles.
- Loosen left front wheel screws.
- Lift the vehicle.
- Remove the left front wheel
- Remove noise insulation and the left front wheel case cover ⇒ Body - external mountings; Rep. Gr. 66 ; External equipment

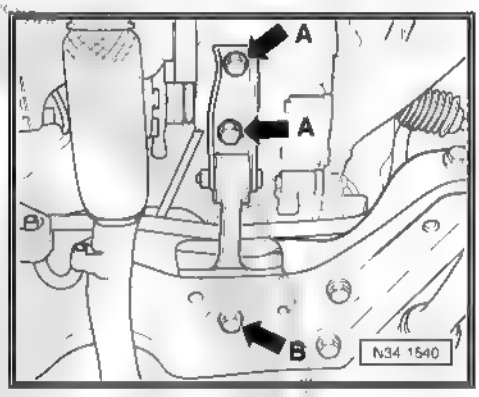


- Pull off connector -1- for reverse gear lights.
- Loosen the attaching nut -arrow- and remove the cable support -2- of Starter -B- .
- Remove the Starter -B- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Remove connectors' bracket.

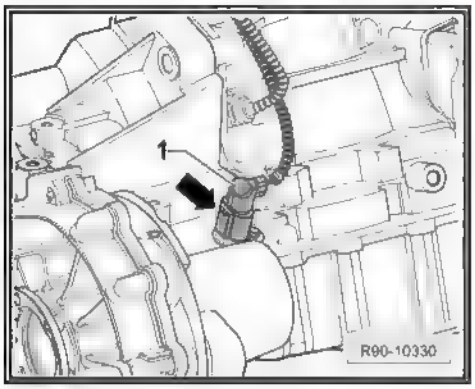


- Remove the attaching screws -arrows A- and -arrow B- of the pendulum support.

For vehicles without ABS:



– Pull off connector -1- of Speed sensor -G22- .



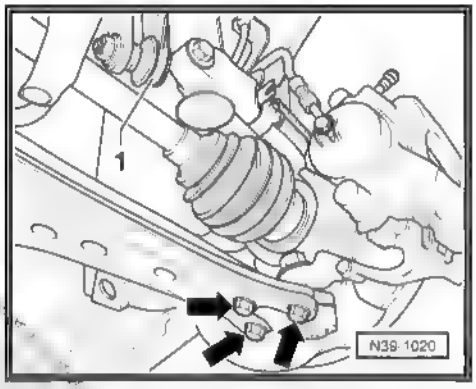
Continuation for all vehicles:

– Remove the front exhaust tube ⇒ Engine; Rep. Gr. 26 ; Exhaust system .
– Loosen the semi-drive shafts (right and left side) of the transmission propulsion flanges ⇒ Running gear, ??axles, ?? steering; Rep. Gr. 40 ; Front suspension .
– Place the semi-drive shafts upwards and fasten it with wire on the suspension pillar.
– Drain transmission oil ⇒ page 62 .
– Remove the transmission propulsion phalange (right side) ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .

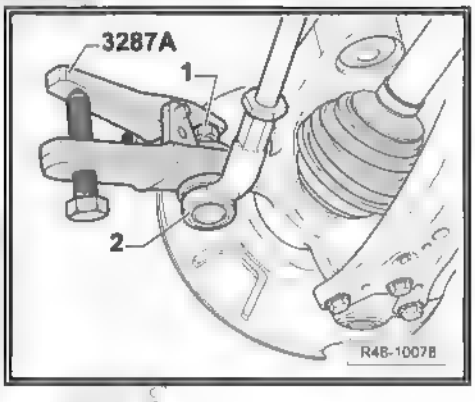
Note

When doing this, be careful to prevent damages on the flanges protective plate.

– Mark the installation position of the screws that fasten the lower articulation of the suspension's left wishbone.
– Loosen the fastening screws -arrows- ⇒ Running gear, ?? axles, ??steering; Rep. Gr. 40 ; Front suspension .
– Release the wishbone from the left coupling bar -1- ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .

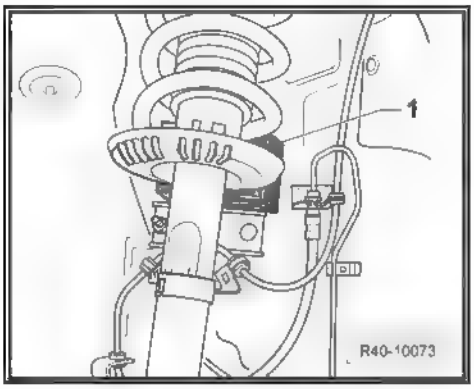


– Loosen the fastening nut -1- from the yoke.
– Separate the steering yoke tip -2- from the steering arm ⇒ Running gear, ??axles, ??steering; Rep. Gr. 48 ; Steering .
– Remove the wheel roller bearing case with the shaft articulation out of the transverse arm.



– Turn the suspension outward and support, for example, with a wooden block -1- , and simultaneously remove the drive axle shaft from the wheel roller bearing

– Secure drive shaft to body with wire

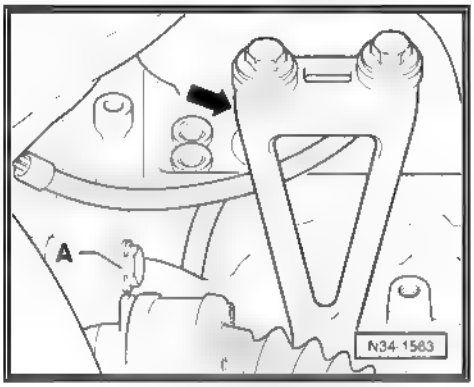


Note

The drive axle shaft must not be pressed downwards. Otherwise, the internal articulation will be damaged due to excessive tilting

– Loosen the screw -A- fastening the engine to transmission by over the right propelling flange.

– Tilt carefully the engine/transmission assembly. To do that, turn the screw on the Bracket or VW 061 -10-222A- approximately 50 mm downwards.



Note

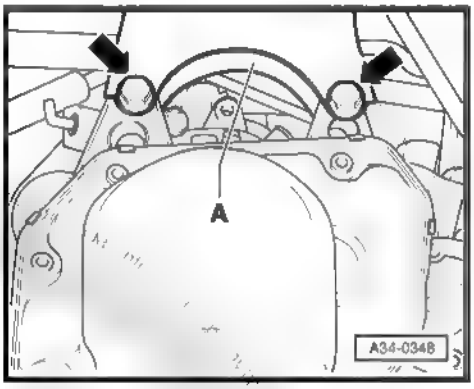
When lowering the engine, make sure the differential is not supported by the subframe.

• Thus, it should be possible accessing the screws -arrows- that fasten the console -A-.

– Loosen the fastening screws -arrows- and remove the console -A-.

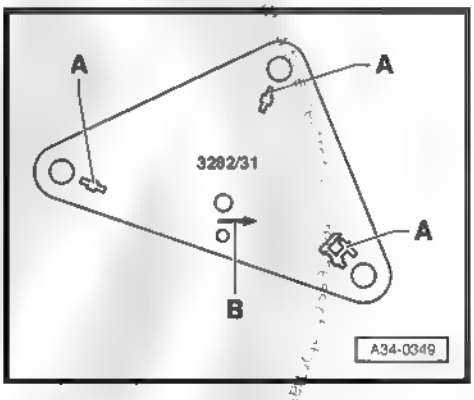
– Install the Support -3282- with Adjustment plate -3282/31- to remove transmission.

– Install the transmission support assembly arms aligned with the adjustment plate holes.

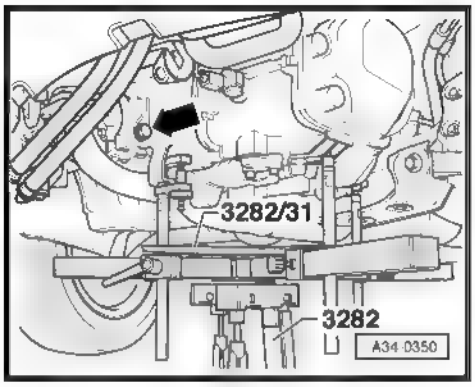


The symbols -A- on the Adjustment plate -3282/31- show the supports required, and arrow -B- indicates run direction.

– Position the Engine and gearbox jack + gearbox or EQ 7081 -VAG 1383A- under the transmission.



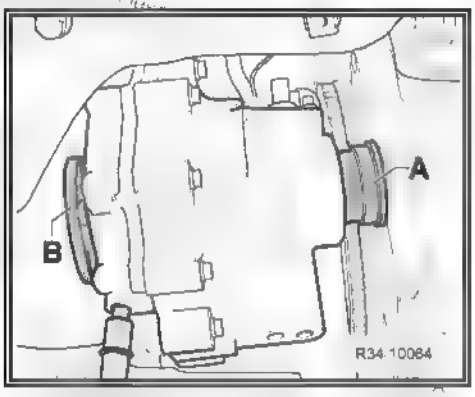
- Align the adjustment plate and engage safety bracket in transmission
- Fasten transmission to Support -3282- .
- Loosen screw that fastens the engine to transmission -arrow-
- Loosen lower screws fastening the engine to transmission
- Separate transmission from engine and turn it carefully towards subframe
- Press the engine outwards, carefully, with the help from a second mechanic.



Caution

Don't let the engine/transmission in contact with the electro fan/ radiator during this operation.

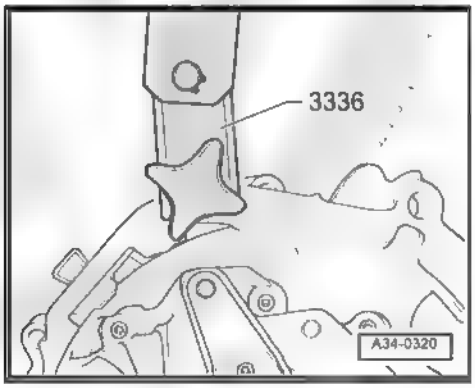
- Turn the transmission downwards by the differential region.
- Next, lower carefully the transmission by passing the right propelling flange -A- close to the flywheel/intermediate plate, and the left propelling flange -B- close to the subframe.
- When lowering, change the transmission position by the spindle of the Engine and gearbox jack + gearbox or EQ 7081 - VAG 1383A- .



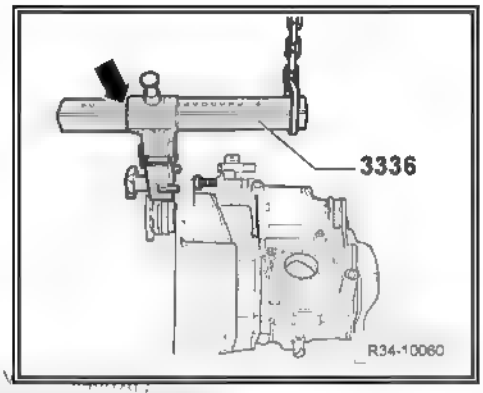
6.1.1 Transmission transport

Using Support -3336- to transport the transmission.

- Install the Support -3336- on the transmission case.



– Adjust arm on guide with locking pins -arrow- in order to expose 6 holes



6.2 Installation

> **WARNING**
>
> *Always replace self-locking nuts and bolts which were subjected to angular torque.*

– Clean the splines on the main drive shaft and lightly grease them with the Lubricating grease -G 000 100- , or consult the ⇒ Chemical Materials Manual .

The clutch disc can easily displace from one side to another on the primary shaft.

– Check that the adjustment pins are installed on the crankcase for aligning engine/transmission, and install them, if required.

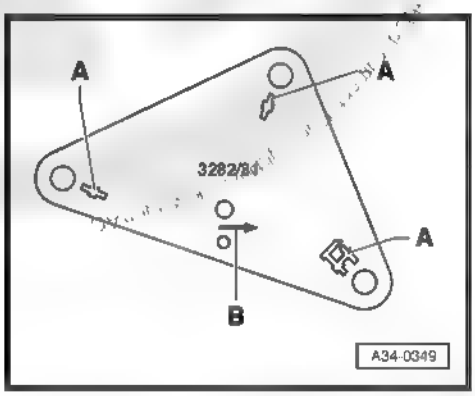
– Make sure the intermediate plate is correctly installed on engine.

– Install the Support -3282- with Adjustment plate -3282/31- to install transmission.

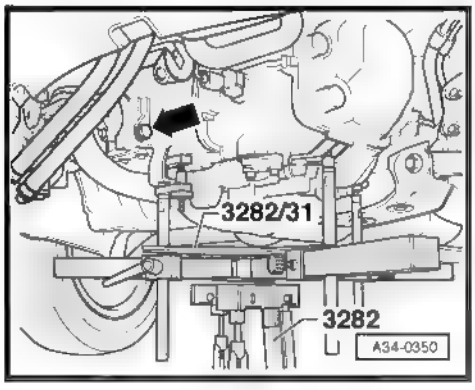
The symbols -A- on the Adjustment plate -3282/31- show the supports required, and arrow -B- indicates run direction.

– Align the plate in parallel to transmission and engage safety bracket on transmission.

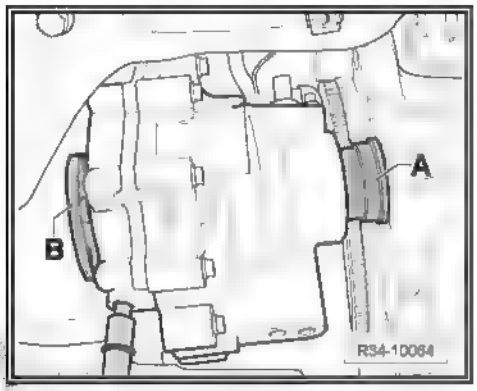
– Fasten transmission to Support -3282- .



– Position the Engine and gearbox jack + gearbox or EQ 7081 -VAG 1383A- under vehicle



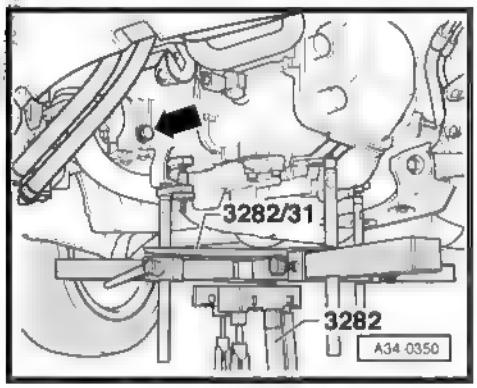
- Raise carefully the transmission by passing the right propelling flange -A- close to the flywheel/intermediate plate, and the left propelling flange -B-close to the subframe.
- When raising, change the transmission position by the spindle of the Engine and gearbox jack + gearbox or EQ 7081 -VAG 1383A- .
- Then, through the Support -3282- fuses, turn the gearbox upwards by the differential area.
- Install transmission.



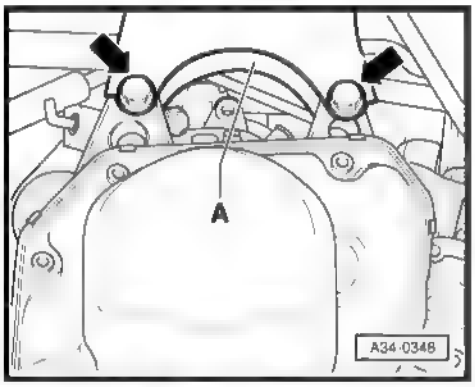
Note

Pay attention to prevent damages on the cooling hose, located between engine and radiator, and the power steering pipes.

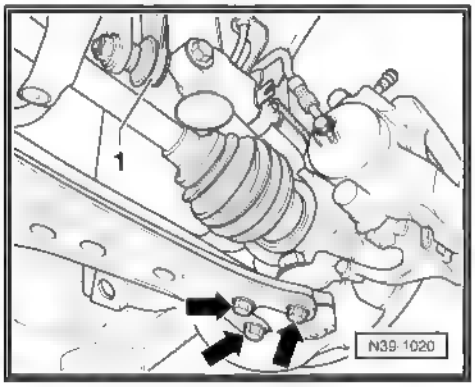
- Tighten the screw -arrow- that fastens the engine and the transmission.
- Tighten the lower screws that fasten the engine to transmission.
- Install the front tube ⇒ Engine; Rep. Gr. 26 ; Exhaust system .
- Remove the Support -3282- with Adjustment plate -3282/31- of the transmission.



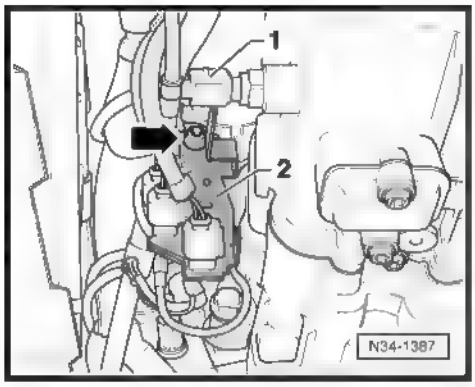
- Install transmission console -A- by using new screws -arrows-.
- Install and tighten the upper fastening screw above the right propulsion flange. Tightening torques, refer to ⇒ page 60 .
- Install the transmission propulsion flange (right side) ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Install drive semi-shafts on the transmission propulsion flanges ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .



- Install the screws -arrows- that fasten the lower joint of the left support arm of the suspension ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Assemble the support arm for the left coupling bar -1- ⇒ Running gear, ??axles, ??steering; Rep. Gr. 48 ; Steering .
- Install the yoke onto the steering arm ⇒ Running gear, ??axles, ??steering; Rep. Gr. 48 ; Steering .
- Install the Starter -B- ⇒ Electrical equipment, Rep. Gr. 27 ; Starter, alternator, battery .

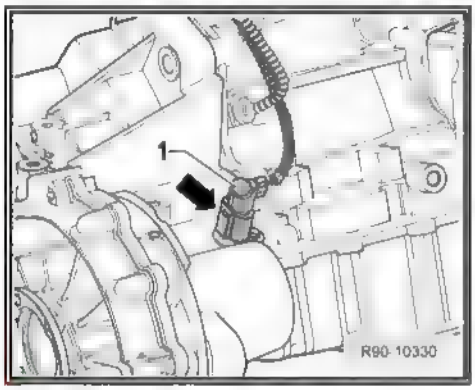


- Install support -2- on the Starter -B- -arrow-.
- Push on connector -1- for reverse gear lights.
- Install connectors on their brackets
- Install earth strap on the upper fastening screw on the engine/ transmission



Continuation for vehicles without ABS:

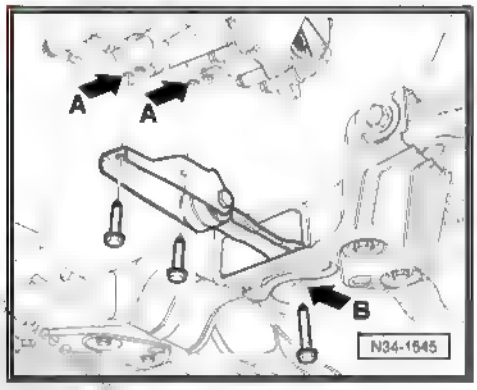
- Push on connector -1- of Speed sensor -G22- .



Continuation for all vehicles:

- Lower vehicle.
- Install and tighten the upper screws that fasten the engine to transmission. Tightening torques, refer to: ⇒ page 60 .
- Install the gear selection mechanism ⇒ page 31 .
- Lift the vehicle.

- Install pendulum support -arrows A- and -arrows B- by using new screws. Tightening torques, refer to ⇒ page 60 .



- Install the noise insulation and the left front wheel case cover ⇒ Body - external mountings; Rep. Gr. 66 ; External equipment .
- Assemble the left front wheel.
- Fill and check the transmission oil ⇒ page 62
- Tighten the front left wheel fastening screws . Tightening torques, refer to: ⇒ Running gear, ??axles, ??steering; Rep. Gr. 44 ; Wheels, tires, vehicle measurement .
- Install the console for the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .
- Install the air filter, it is installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .
- Connect the Battery -A- ⇒ Electrical equipment; Rep. Gr. 27 ; Starter, alternator, battery .

6.2.1 Tightening torque

WARNING

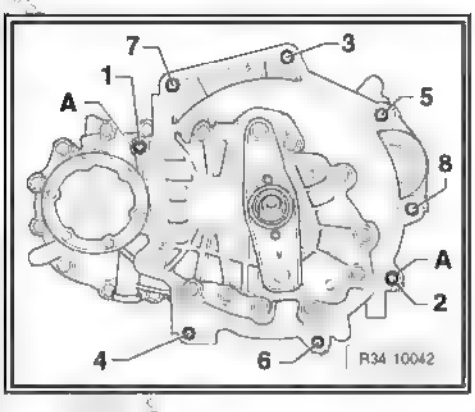
Always replace self-locking nuts and bolts which were subjected to angular torque.

Transmission to engine:

Vehicles with 1.6 L gasoline/ethanol engines

Strictly follow the tightening sequence showed by the illustration

pos.	Screw	Nm
1	M 12 x 70	80
2	M 12 x 55	80
3	M 12 x 55	80
4	M 10 x 50	40
5 [2]	M 12 x 125	80
6	M 10 x 50	40
7	M 12 x 55	80
8	M 12 x 125	80



2) Also for fastening the Starter -B- to the transmission

-Item A- - Adjustment pins

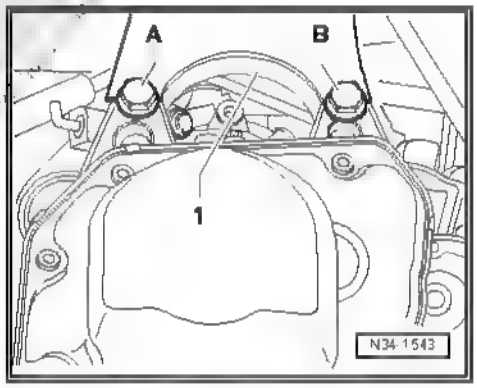
Console -1- to transmission:

1 - Console to transmission

A - [3] = 40 Nm + 90°

B - [3] = 40 Nm + 90°

3) Replace



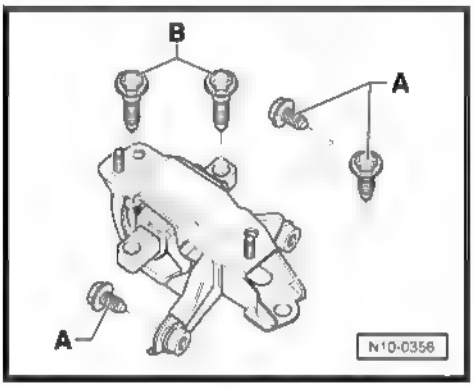
Support for power-drive group - transmission

A - [4] = 50 Nm + 90°

B - [4] = 40 Nm + 90°

4) Replace.

Install engine/transmission support without any stress ⇒ Engine; Rep. Gr. 10 ; Cylinders, engine block, support, cover .



Pendulum support

A - [5] = 30 Nm + 90°

B - [5] = 40 Nm + 90°

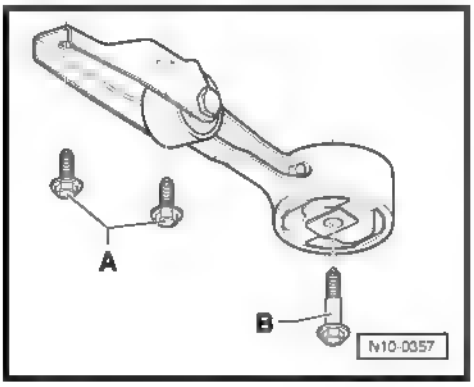
5) Replace

For other torques, refer to the respective repair groups:

Semi-articulated shaft to propelling flange ⇒ Running gear, ??axles, ??steering, Rep. Gr. 40 ; Front suspension .

Lower drive to wishbone ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .

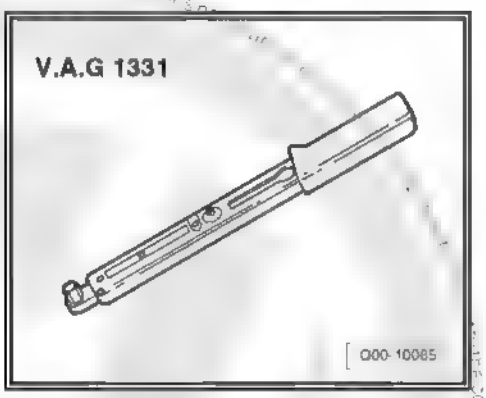
Coupling bar to wishbone ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .



7 Transmission oil level - check and replenish

Special tools and workshop equipment required

- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-



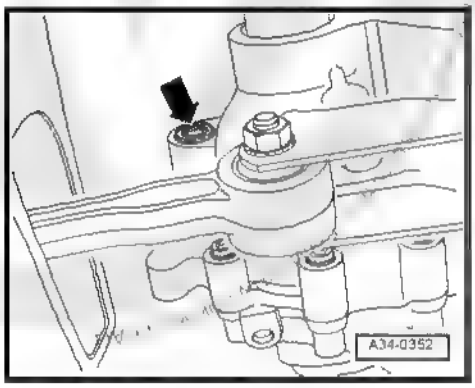
7.1 Oil level - check

Transmission oil specification ⇒ page 1 .

– Loosen screw (plug) -arrow- to check the oil.

The oil level will be OK if the transmission has oil up to the lower edge of the checking hole.

– Install the screw (plug) -arrow- with torque ⇒ Item 3 (page 69) .



7.2 Oil level - replenish

To fill completely the reservoir with new oil:

– Loosen screw (plug) -arrow-.

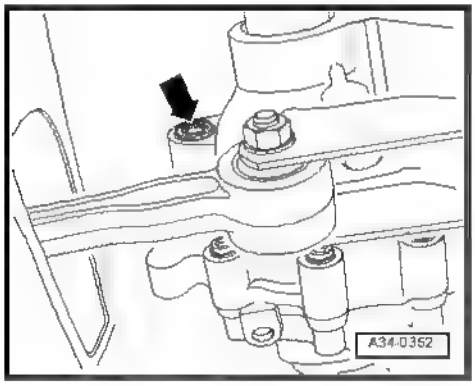
– Fill with oil up to the lower edge of the checking hole.

– Install the screw (plug) -arrow-.

– Start engine, engage a gear and let the transmission operate for approx. 2 minutes.

– Stop engine and replenish the oil up to the lower edge of the checking hole.

– Install the screw (plug) -arrow- with torque ⇒ Item 3 (page 69) .



8 Oil level for the gear selection mechanism - check and replenish

8.1 Oil level - check

Check conditions:

- First, the engine should be turned off.
- At the beginning of the check, the initial oil temperature may be above 30 °C.
- The transmission should not be operating.
- The vehicle should be stopped on a horizontal and even surface.
- The selector lever should be in position "N" and the parking break should be activated.
- To check the oil level in the reservoir, the hydraulic system must be depressurized.

Oil specification for gear selector mechanism ⇒ page 1 .

> ⚠ WARNING
>
> *To check the oil level in the reservoir, the hydraulic system must be depressurized.*

– Using Diagnosis, Measurement and Information System -VAS 5052- to depressurize the hydraulic system.

– Operate the parking brake.

– Position the gear shifter "N".

– Turn vehicle on.

– Connect the Diagnosis, Measurement and Information System -VAS 5052- ⇒ page 16 .

– Connect the Vehicle diagnosis, measurement and information system -VAS 5052- and select the mode "Assisted troubleshooting".

– Press the Advanced key and select "Function/component selection" and then the following menu functions:

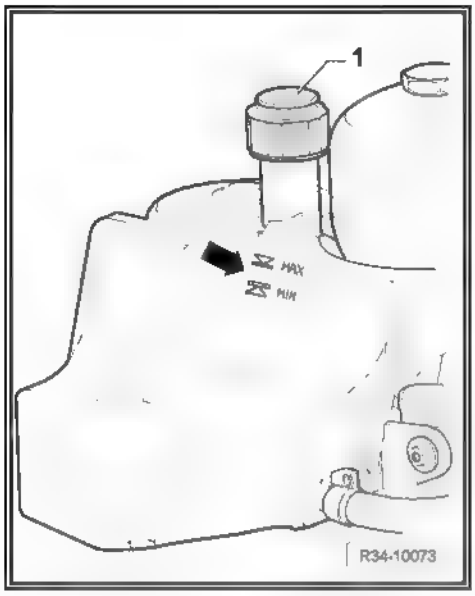
◆ Functions

◆ Relieve the hydraulic system pressure

– Remove the air filter, it is installed behind the Battery -A- ⇒ Engine; Rep. Gr. 24 ; Fuel supply - injection system .

– Loosen the reservoir cover -1-

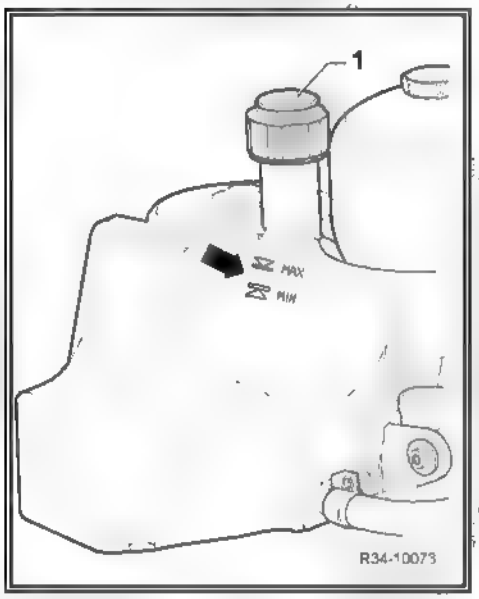
The oil level should be between the marks identified as "MAX" and "MIN" in the reservoir -arrow-.



8.2 Oil level - replenish

To fill completely the reservoir with new oil:

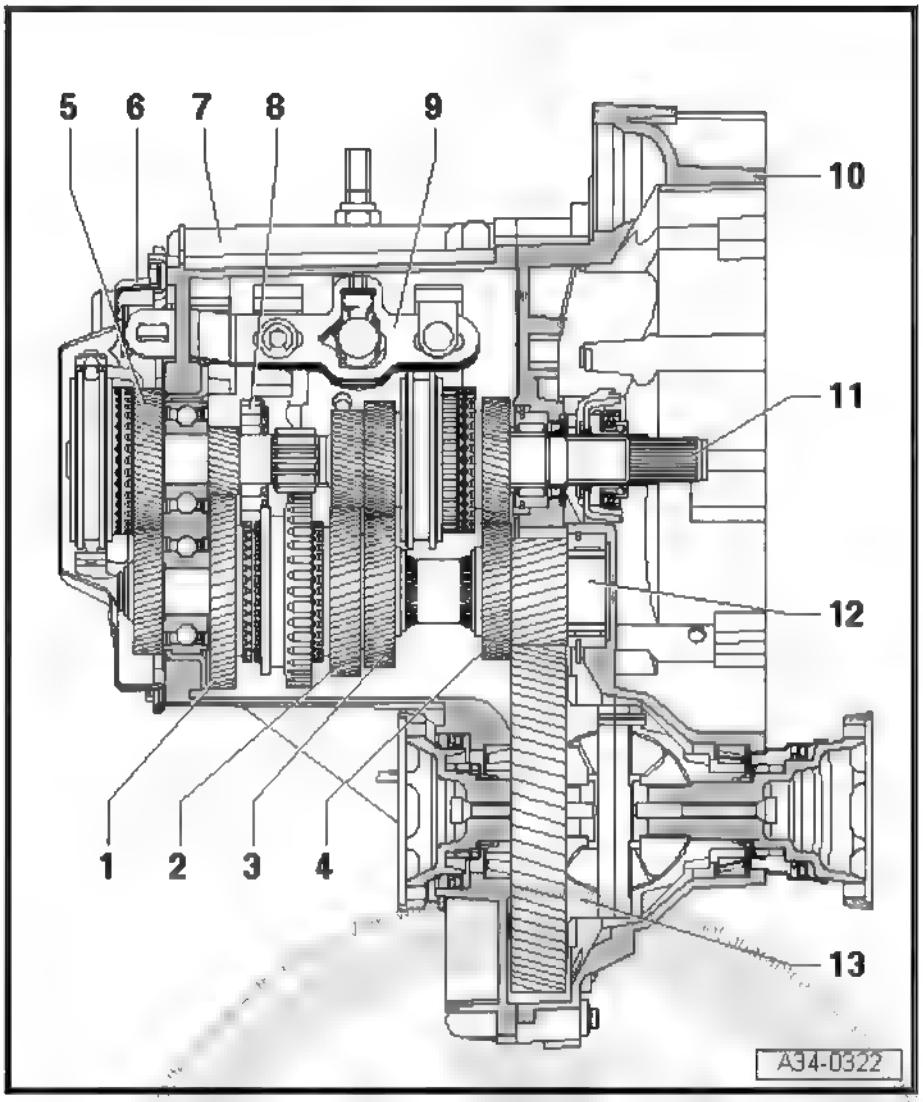
– Fill with oil up to the lower edge of the checking hole (MAX).
– Loosen the reservoir cover -1-.
– Install the reservoir cover -1-.
– Pressurize the hydraulic system.
– Turn on the engine, engage a gear and check all gear positions.



9 Transmission - disassemble and assemble

1 - 1nd. gear
2 - 2nd. gear
3 - 3nd. gear
4 - 4nd. gear
5 - 5nd. gear
6 - Transmission case cover
7 - Transmission case
8 - Reverse gear
9 - Selection mechanism
- ❑ Selection forks.

10 - Clutch case
11 - Primary shaft
12 - Secondary pinion shaft
13 - Differential

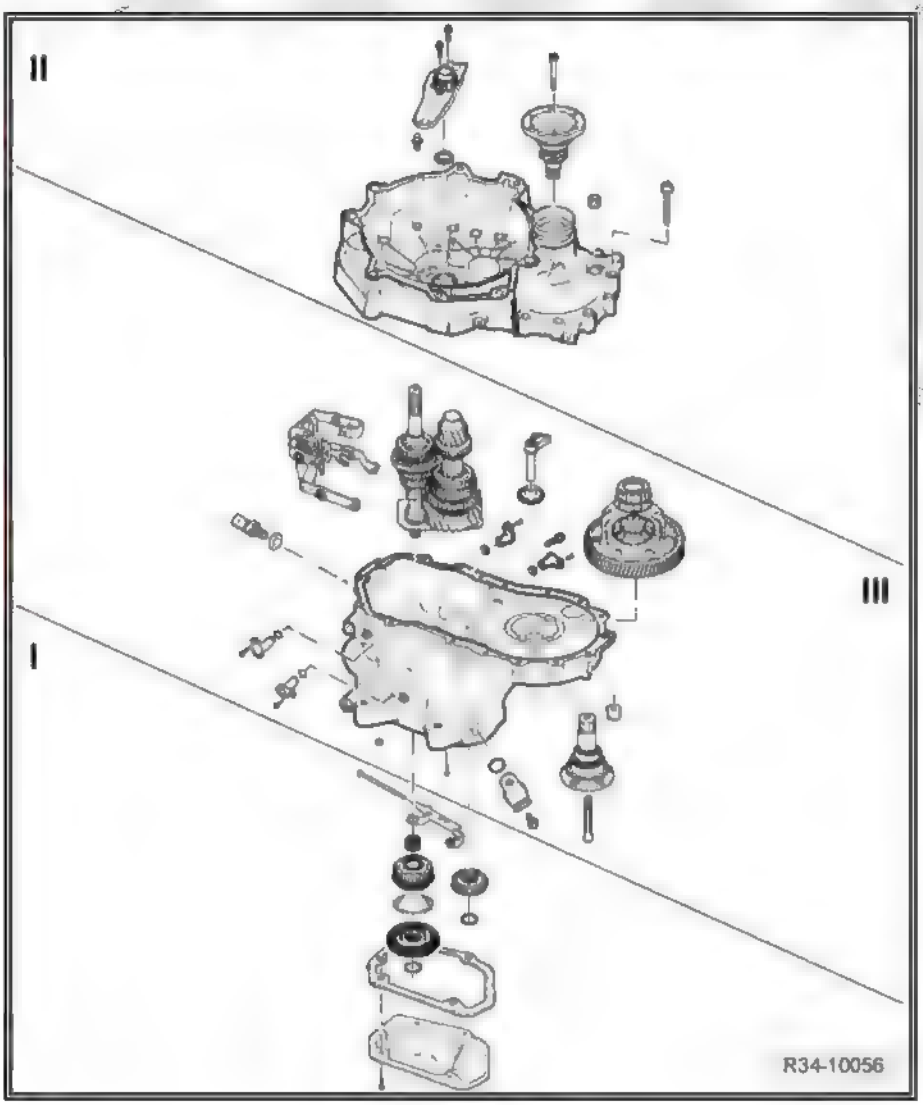


9.1 Transmission - assembly overview

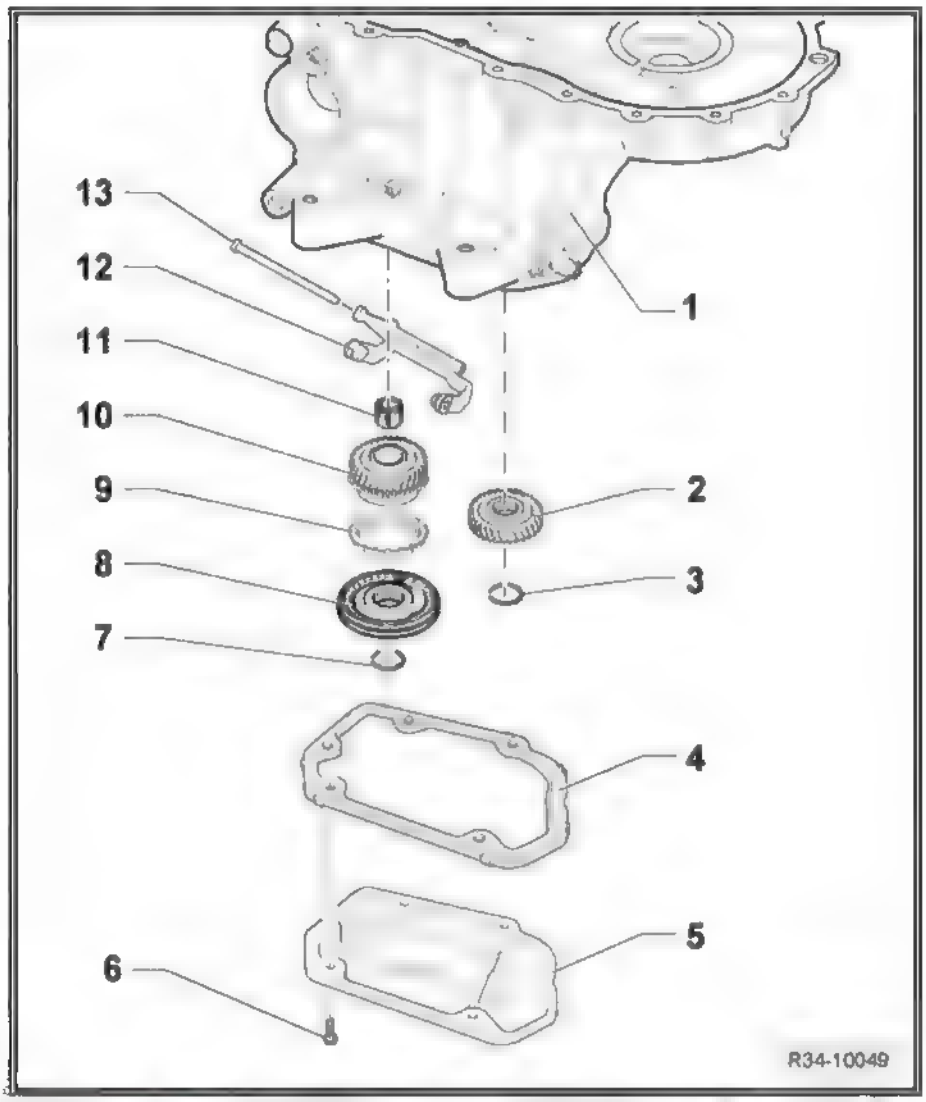
I - Transmission case cover and 5nd. gear ⇒ page 67 .

II - Clutch case ⇒ page 68 .

III - Primary shaft, pinion shaft, differential, selection mechanism and selection forks ⇒ page 69 .



9.2 I - Transmission case cover and 5nd. gear



1 - Transmission case
- ❑ Manufactured in aluminum.
- ❑ Allocation ⇒ Electronic Parts Catalogue (ET-KA) .

2 - Gear for the 5nd. gear
- ❑ Installation position ⇒ page 76

3 - Circlip
- ❑ Replace whenever removed.
- ❑ Determine thickness ⇒ page 77 .

4 - Gasket

5 - Transmission case cover and 5nd. gear

Note

6 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

7 - Circlip
- ❑ Replace whenever removed.
- ❑ Determine thickness ⇒ page 77 .

8 - Synchronizer with engaging sleeve and stop ring for 5nd. gear
- ❑ Disassemble and assemble ⇒ page 88 .

9 - Synchronizer ring for 5nd. gear

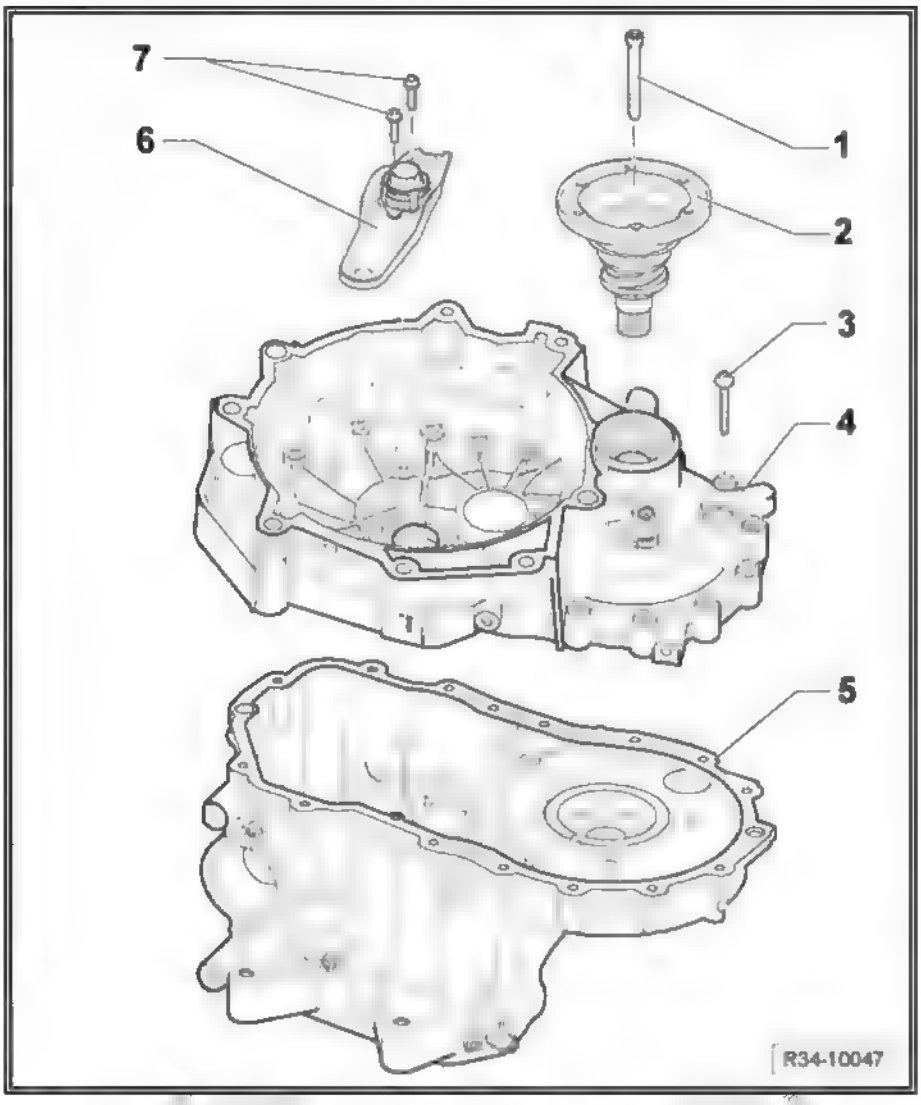
10 - Selector gear for 5ndgear
- ❑ Installation position of 5nd. gear ⇒ page 76

11 - Needle roller bearing
- ❑ For 5nd. gear wheel.

12 - Selector gear for 5nd. gear
- ❑ Disassemble and assemble ⇒ page 84 .

13 - Bearing pin
- ❑ Selection fork for 5nd. gear wheel.

9.3 II - Clutch case



1 - Tapered screw
- ❑ 25 Nm

2 - Propelling flange with pressure spring

3 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

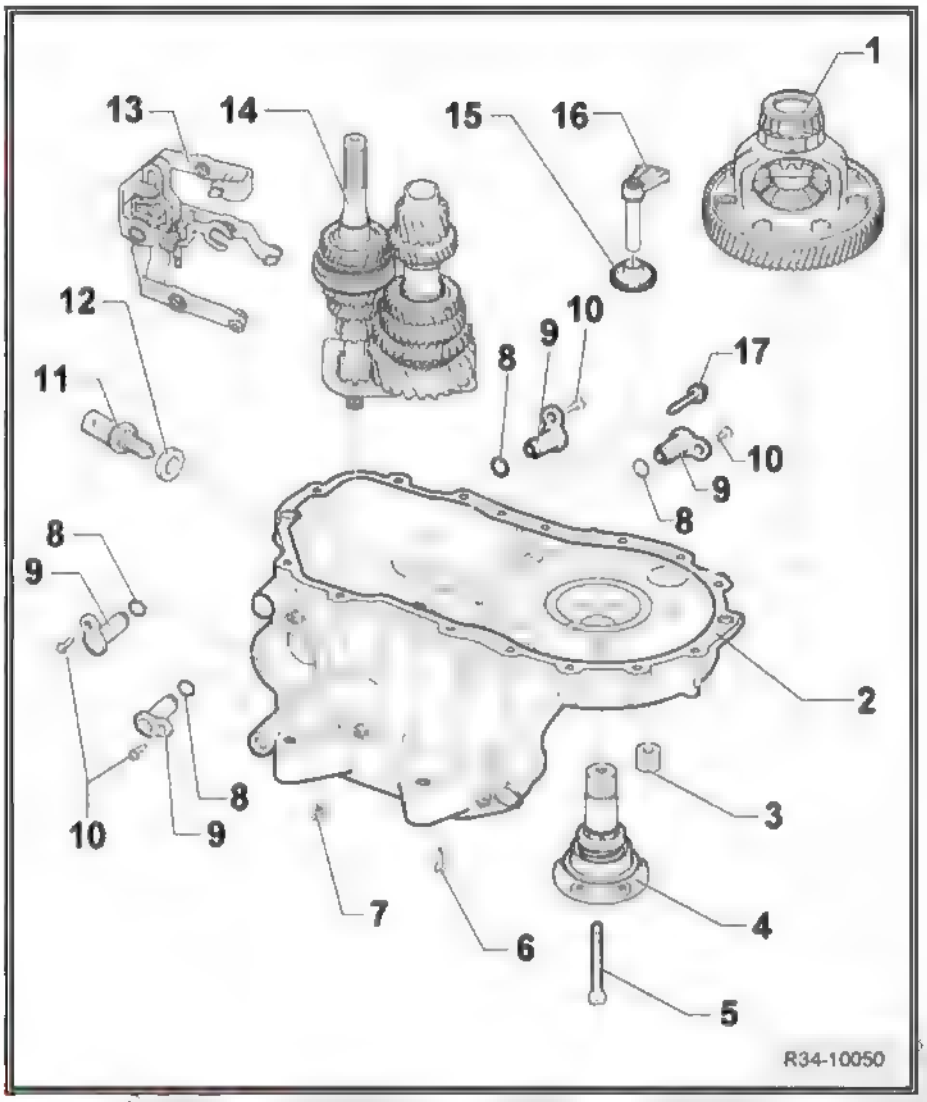
4 - Clutch case
- ❑ Manufactured in aluminum.
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty - AMV 188 200 03- evenly on the sealing surface.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

5 - Transmission case
- ❑ Manufactured in aluminum
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty - AMV 188 200 03- evenly on the sealing surface.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

6 - Clutch lever
- ❑ Remove and install with the roller bearing guide and clutch bearing.

7 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

9.4 III - Primary shaft, pinion shaft, differential, selection mechanism and selection forks



1 - Differential
- ❑ Disassemble and assemble ⇒ page 111 .

2 - Transmission case
- ❑ Manufactured in aluminum
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty - AMV 188 200 03- evenly on the sealing surface.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

3 - Oil draining screw (plug)
- ❑ 25 Nm.

4 - Propelling flange

5 - Tapered screw
- ❑ 25 Nm.

6 - Screw
- ❑ Self-locking.
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.
- ❑ For fastening the ball bearing support on the primary drive and pinion ⇒ Item 14 (page 69) .

7 - Hexagon nut
- ❑ 23 Nm.
- ❑ For the selection mechanism ⇒ Item 13 (page 69) .

8 - O-ring
- ❑ Replace whenever removed.

9 - Bearing pin

10 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed

11 - Reverse gear light switch
- ❑ 25 Nm

12 - Sealing ring
- ❑ Replace whenever removed.

13 - Selection mechanism
- ❑ Selection forks.
- ❑ Disassemble and assemble ⇒ page 84 .

14 - Primary shaft and pinion shaft with ball bearing support

- ❑ Clean the threaded holes of the roller bearing support (e.g. Tap M6).
- ❑ Removing the roller bearing support ➔ page 93
- ❑ Disassemble and assemble the primary shaft ➔ page 88 .
- ❑ Disassemble and assemble the pinion shaft ➔ page 99 .

15 - Reverse gear

16 - Reverse gear intermediate shaft

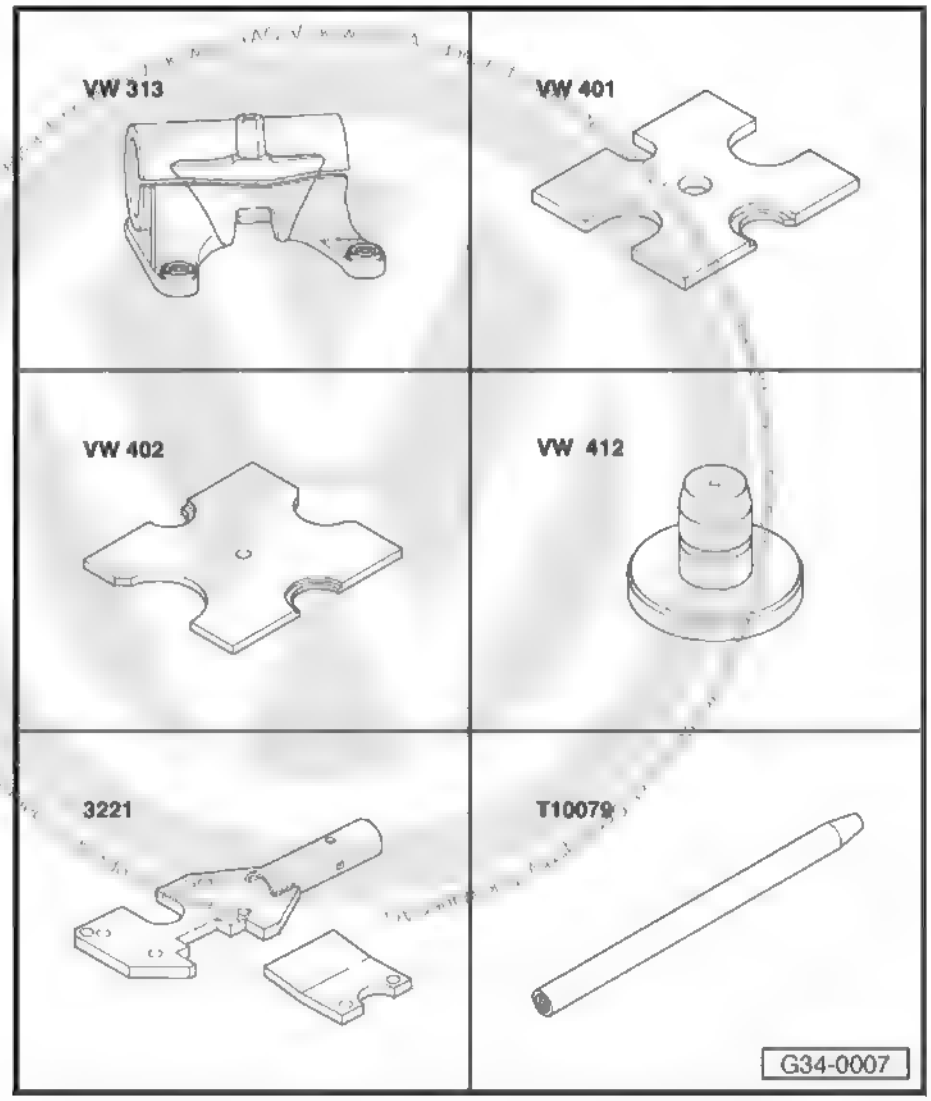
17 - Screw

- ❑ For fastening the intermediate reverse gear shaft.
- ❑ M6: 5 Nm + 90°.
- ❑ M8: 25 Nm + 90°.
- ❑ Replace whenever removed.

9.5 Primary shaft, pinion shaft, differential, selection mechanism and selection forks - disassemble and assemble

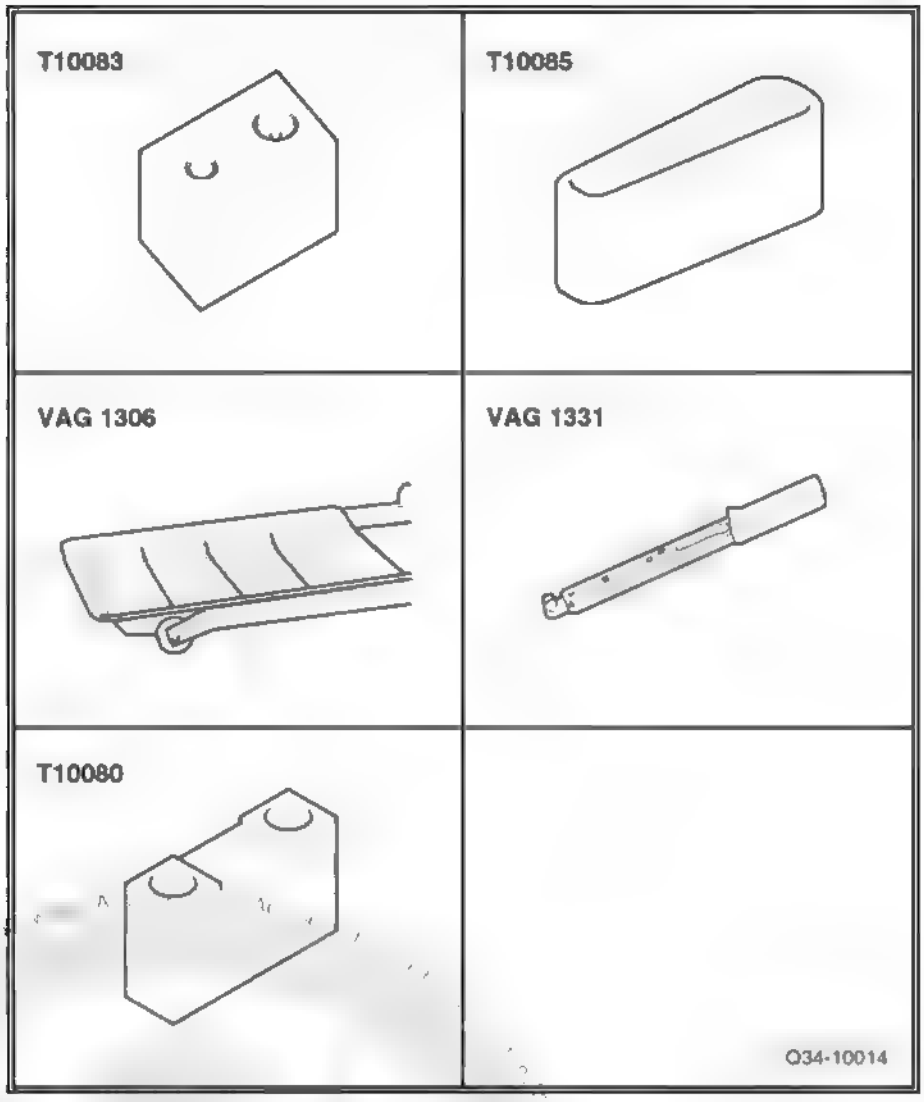
Special tools and workshop equipment required

- ♦ Support for VW643 or VW 643/1 -VW 313- or Rotary stand for engine and transmission -VAS 6095-
- ♦ Thrust plate -VW 401-
- ♦ Thrust plate -VW 402-
- ♦ Pressure Disc -VW 412-
- ♦ Support -3221-
- ♦ Guide pin -T 10079-



Special tools and workshop equipment required

- Pressure shim -T 10083-
- Thrust pad -T10085-
- Drip tray -VAG 1306-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- Pressure shim -T10080-

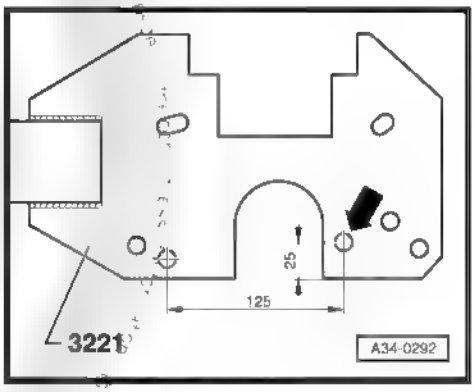


Modify the support for the Support -3221- :

A new hole is required to fasten the automated transmission (ASG) 0C3 to the transmission support.

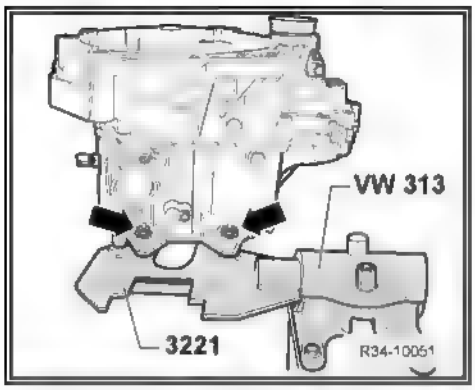
Measures in mm:

– Make a hole of Ø11.0 mm -arrow- on the Support -3221- .

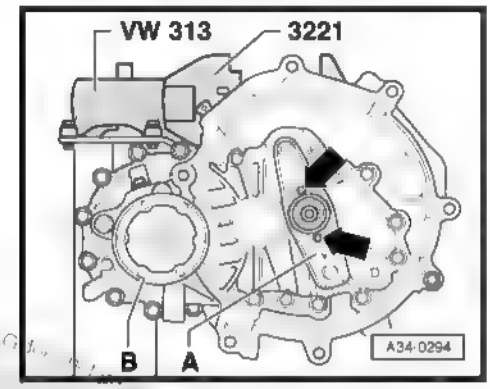


9.5.1 Disassembly

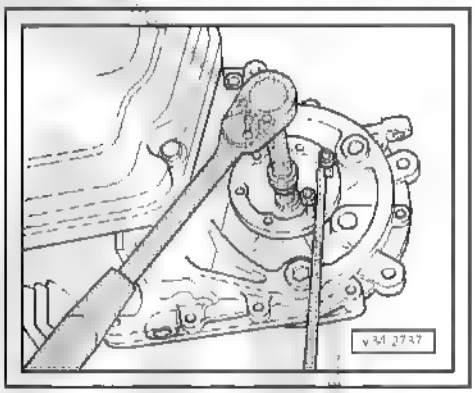
- Fasten the transmission on the Support for VW643 or VW 643/1 -VW 313- or Rotary stand for engine and transmission -VAS 6095- -arrows-, as indicated.
- Place a Drip tray -VAG 1306- under the transmission.
- Drain transmission oil ➢ page 62 .



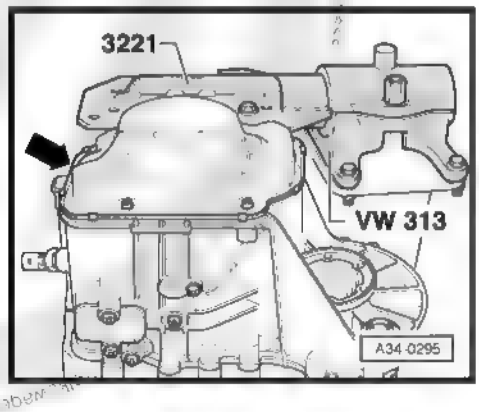
- Remove clutch lever -A- with the clutch bearing and bearing guide -arrows-.



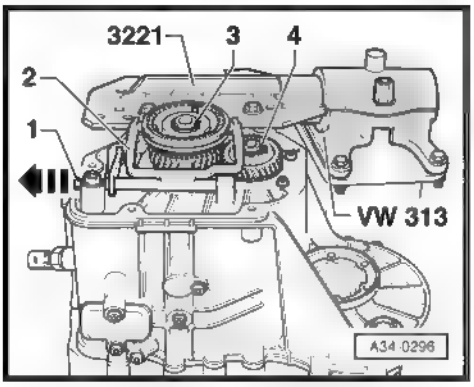
- Remove the propelling flange fastening screw on right side -B-, by using two screws to lock the flange with a lever.
- Remove propelling flange.



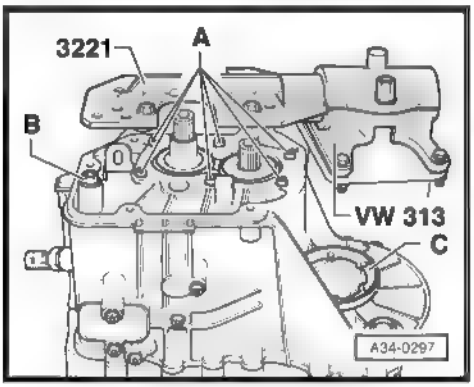
- Remove the transmission case cover -arrow-.



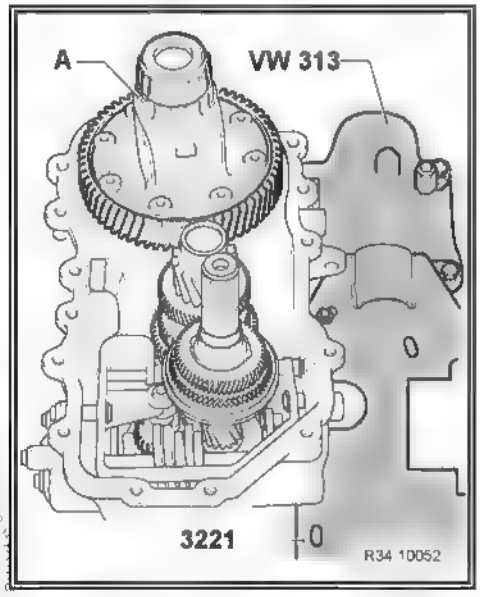
- Remove the pin -1- from the selection fork bearing from 5nd gear -2- selection fork bearing and remove the selection fork
- Remove the circlip -3- and remove the 5 th gear synchronizernd
- Remove the circlip -4- and remove the 5nd. gear wheel



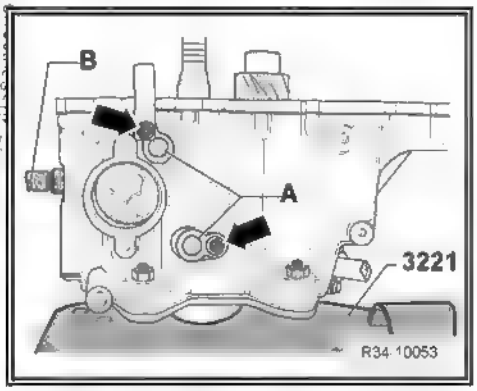
- Remove the attaching screws -A- from the primary and pinion shaft bearings
- Remove the hexagonal nut -B- from the selection mechanism (reverse gear fastening).
- Remove the propelling flange fastening screw on left side -C-, by using two screws to lock the flange with a lever.
- Remove propelling flange.
- Place the transmission with the clutch case facing upwards.
- Remove the fastening screws from the clutch.
- Remove the clutch case carefully by leveraging via shoulders around the whole case alternately, without damaging the sealing surfaces.



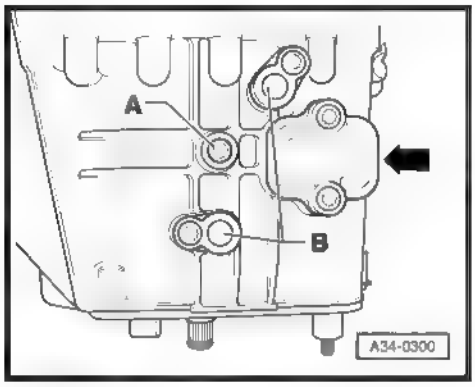
- Remove differential -A- from the transmission case.



- Loosen the fastening screws -arrows- and remove the pins from the bearings -A- from the upper part of the transmission.
- Remove reverse gear light switch -B-.



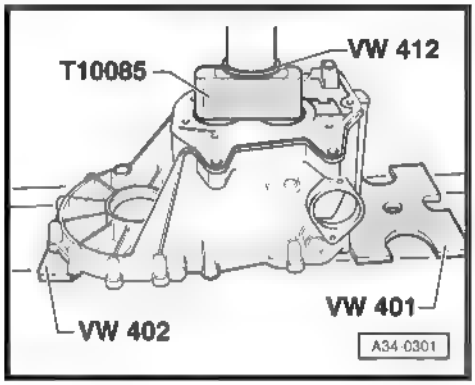
- Remove the screw -A- that fastens the reverse gear wheel shaft
- Remove bearing pins -B- on the lower transmission part



Note

Do not remove the cover cap -arrow- to disassemble the transmission.

- Install the transmission case over the Thrust plate -VW 401- and Thrust plate -VW 402- , in order that the case adjustment pins are not damaged.
- Remove primary and pinion shafts simultaneously from the roller bearing support, with the selection mechanism (selection fork) and the reverse gear wheel

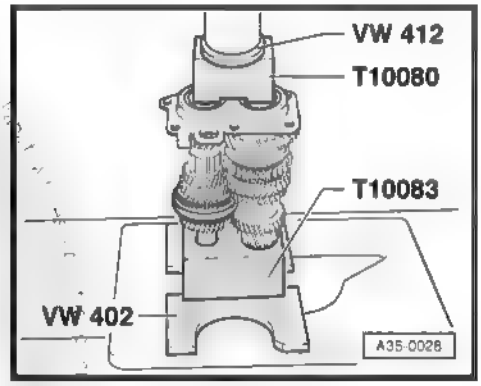


Note

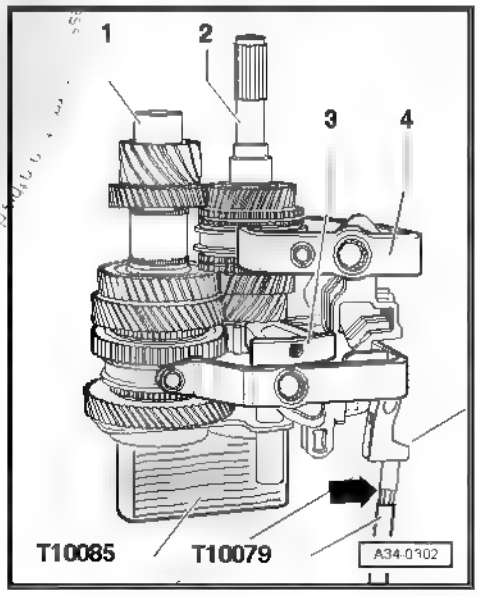
During pressing, make sure the parts do not fall. If required, ask for help from a second mechanic.

9.5.2 Assembly

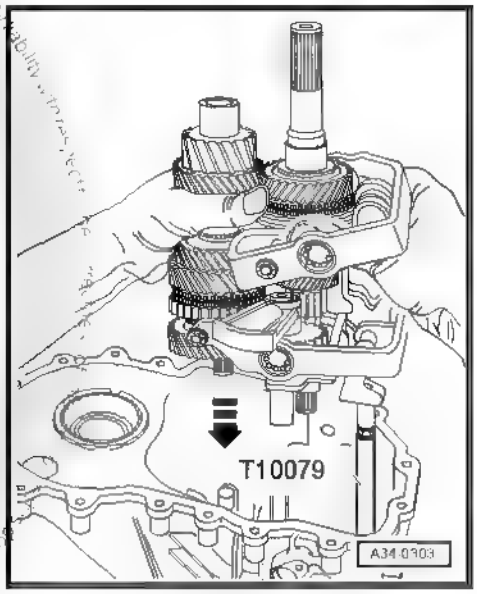
- Simultaneously install the primary drive shaft and the pinion on the bearing support using the Pressure shim -T 10083- and Pressure shim -T 10080- .



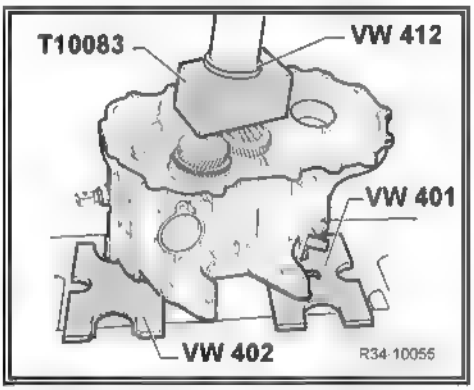
- Install primary shaft -2-, and pinion shaft -1- with the bearing/ ball bearing housing on the Thrust pad -T 10085- .
- Install the selection mechanism (selection forks) -4- on the shaft engaging sleeves.
- Install the reverse gear wheel shaft -3- with gear.
- Install the Guide pin -T 10079- on threaded pin (reverse gear fastening) -arrow-.



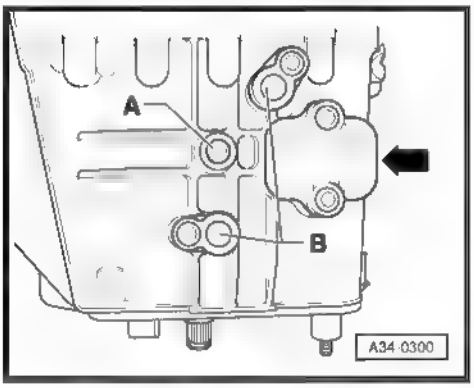
- Install all the components in the gearbox case, by directing the Guide pin -T 10079- into the case through the gearshift mechanism's supporting hole.
- Release Guide pin -T 10079- .
- Before pressing on the roller bearing housing, check the correct fitting of the selection forks on the gearing sleeves



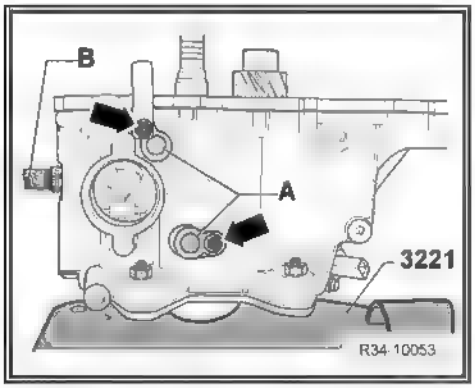
- Press carefully the roller bearing support with the primary and pinion shafts to the stop.



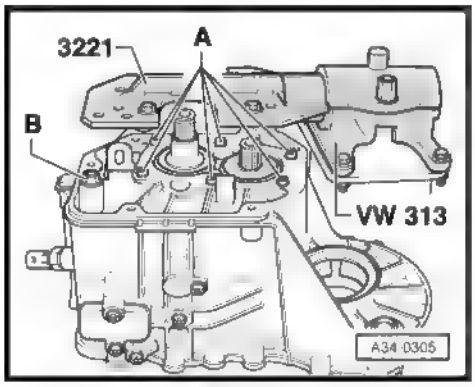
- Install screw -A- on the reverse gear wheel shaft.
- Install bearing pins -B- on the lower transmission part.



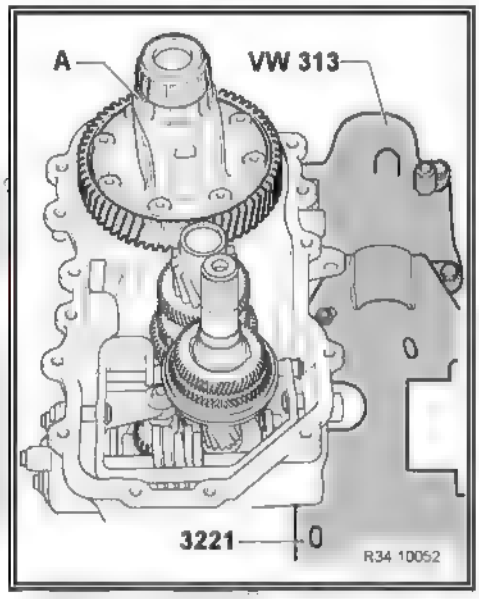
- Install reverse gear light switch -B-.
- Install bearing pins -A- on the upper transmission part.
- Position the selector on "idle".
- Apply the Sealing putty -AMV 188 200 03- evenly on the selector cover's surface
- Install the flange and the selector lever axle



- Install bearing supports on the primary and pinion shafts by using new screws -A- tightening in cross and phased pattern, starting by the middle.
- Install hex nut -B- for the selection mechanism (selection forks).



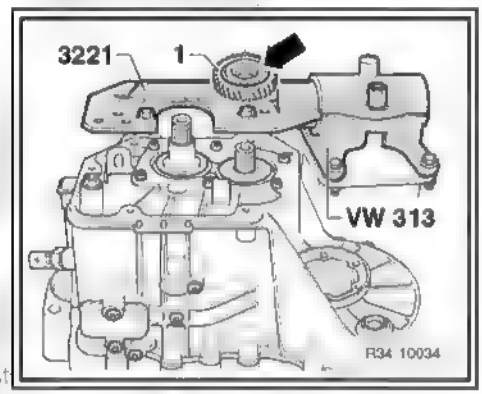
- Install differential -A-.
- Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface of the transmission case. Refer to the ⇒ Chemical Materials Manual .
- Install the clutch case on the transmission case and tighten screws to the specified tightening torque ⇒ Item 3 (page 68) .
- Place the transmission with the clutch case facing upwards.
- Install 5nd. gear -1- with the needle bearing.



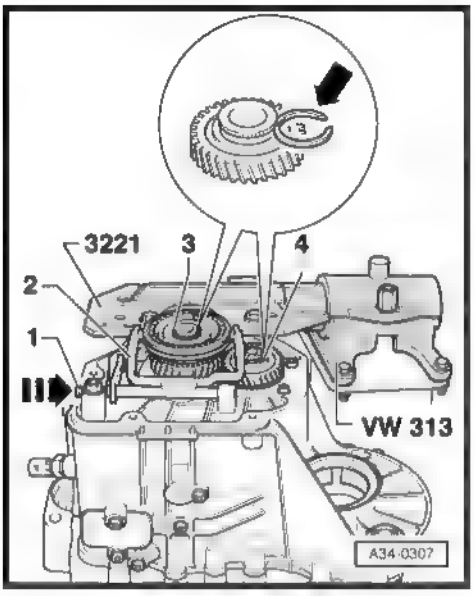
Installation position for 5nd. gear

The wide collar -arrow- shall point to the transmission case cover.

- Install the 5nd. gear synchronizer ring on the wheel.
- Install the complete 5nd. gear synchronizer with the gearing sleeve and stop ring.



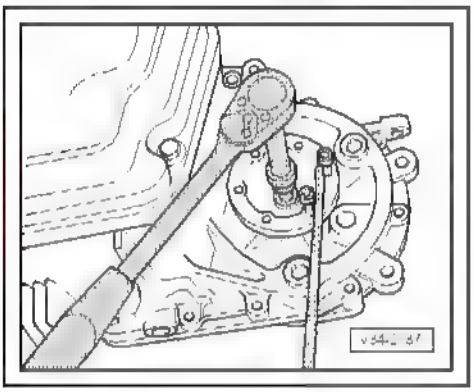
– Install the 5th gear selection fork$_{nd}$. gear -2- and push the bearing pin -1- to the stop, towards -arrow-.
– Determine the new circlip thickness -arrow-
.
– Identify and install circlip on the primary -3- and pinion shafts -4-.



Circlips available

Thickness (mm)	Replacement parts No.
2,00	-085 311 187-
2,10	-085 311 187 A-
2,20	-085 311 187 B-

– Install the transmission case cover.

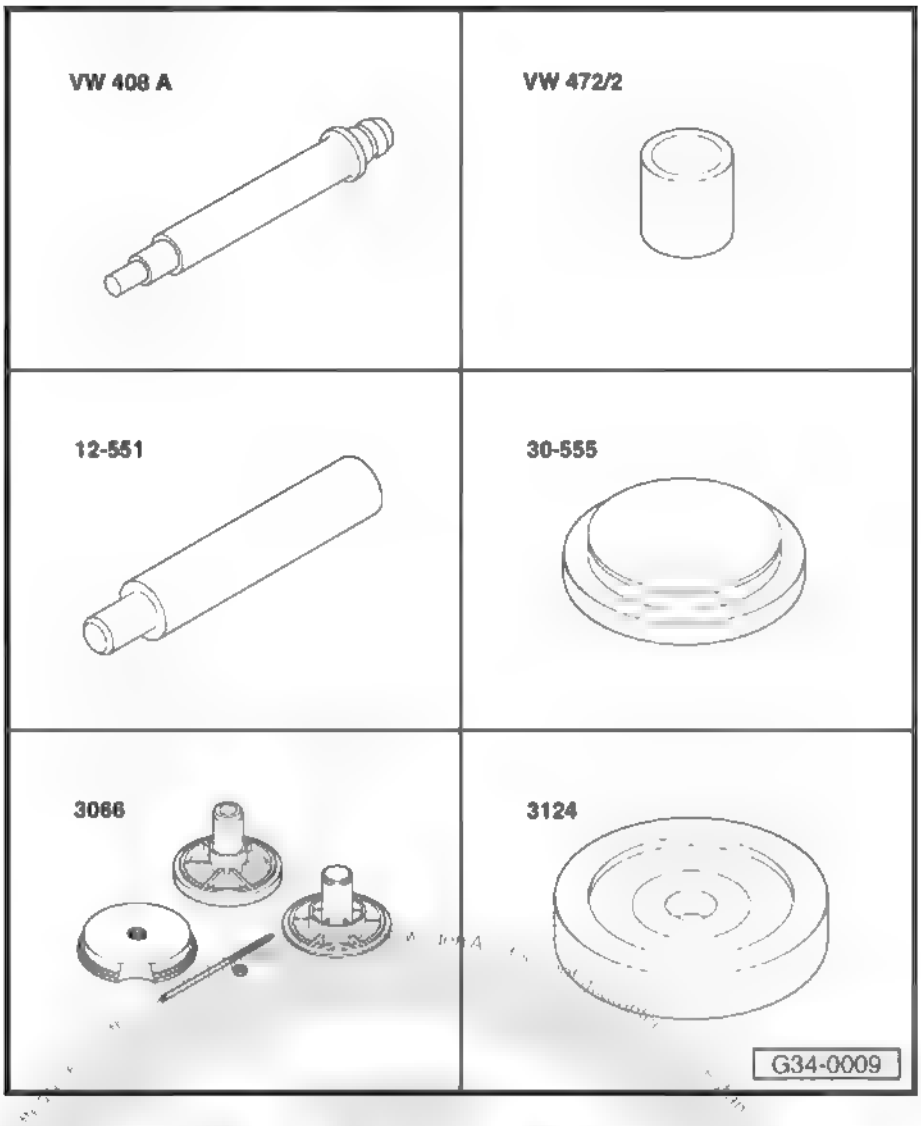


– Install propelling flanges.
– Install clutch lever with bearing and bearing guide ⇒ page 12
– Fill with transmission oil ⇒ page 62 .

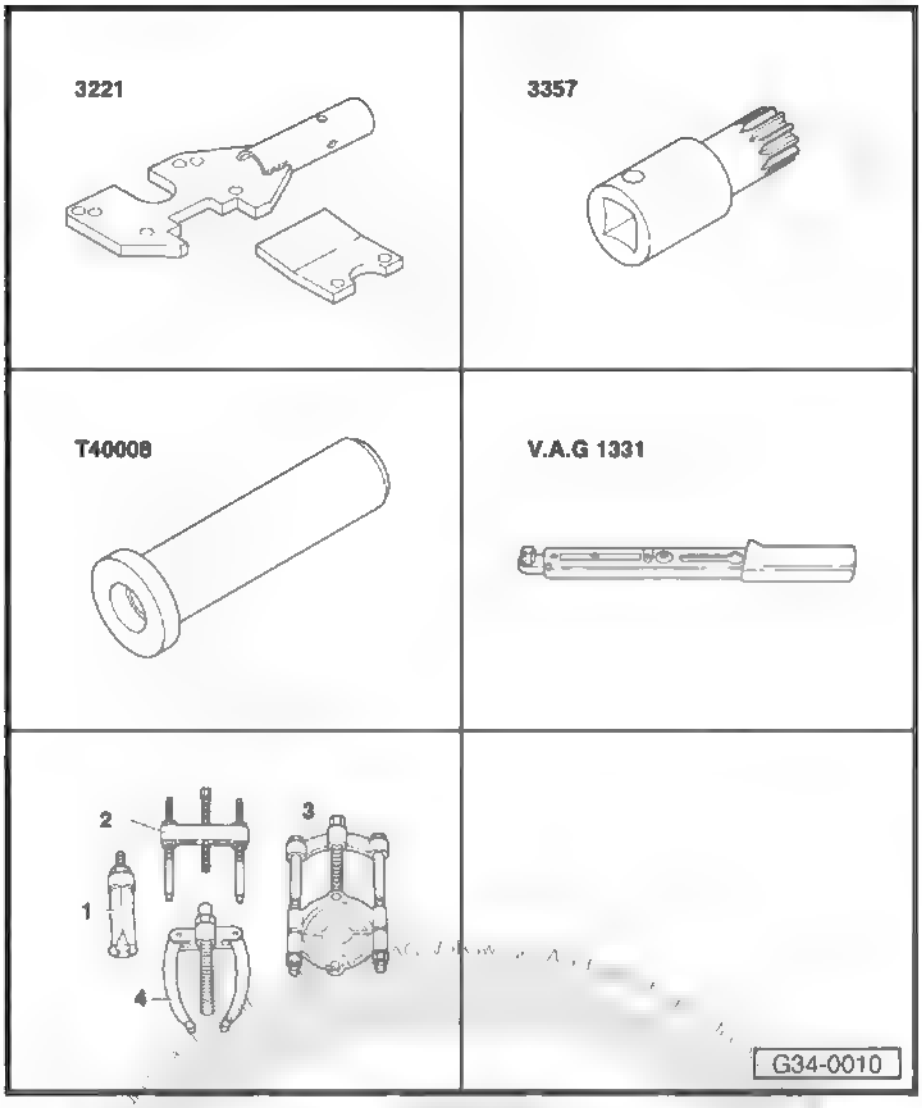
10 Transmission and clutch cases - repair

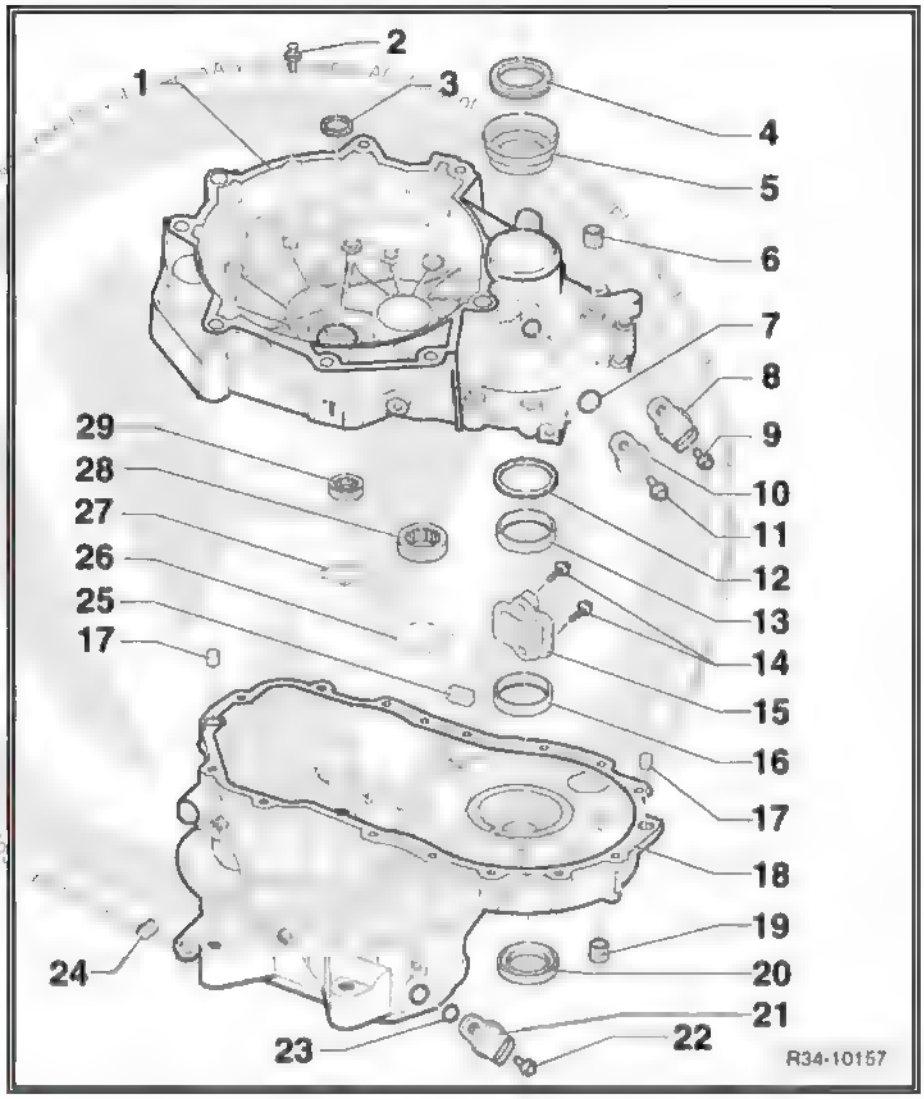
Special tools and workshop equipment required

- Pressure pin -VW 408A-
- Sleeve -VW 472/2-
- Centering pin -12-551-
- Pressure Disc -30-555-
- Mounting device -3066-
- Pressure plate -3124-



- Support -3221-
- Multi-teeth socket SW 27 -3357-
- Pressure tube -T 40008-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- -2- Extractor 65 - 160 mm - KUKKO 18/1-
- -3- Spacer 12 - 75 mm - KUKKO 17/1-





1 - Clutch case
- ❑ Manufactured in aluminum.
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty - AMV 188 200 03- evenly on the sealing surface of the transmission case.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

2 - Ball pin
- ❑ 20 Nm.
- ❑ Lubricate with grease. Refer to the ⇒ Chemical Materials Manual .

3 - Sealing ring for primary shaft
- ❑ Remove by leveraging with screwdriver.
- ❑ Installation ⇒ page 82

4 - Sealing ring for the right propelling flange
- ❑ Replace with the transmission installed ⇒ page 107 .

5 - Bushing
- ❑ For the sealing ring
- ❑ Removal ⇒ page 82
- ❑ Installation ⇒ page 82

6 - Oil replenishment screw (plug)
- ❑ 25 Nm.

7 - O-ring
- ❑ Replace whenever removed.

8 - Speed sensor -G22-
- ❑ For vehicles without ABS.

9 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

10 - Cover
- ❑ For vehicles with ABS.

11 - Screw
- ❑ 5 Nm + 10°.
- ❑ Replace whenever removed

12 - Adjustment shim S_2
- ❑ For the differential.
- ❑ Determine thickness ⇒ page 119 .

13 - Outside ring on the tapered roller bearing
- ❑ For the differential.
- ❑ Remove ➢ page 116
- ❑ Install ➢ page 117
- ❑ In case of replacement, always adjust differential ➢ page 119 .

14 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

15 - Reservoir lid
- ❑ Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface before installing.

16 - Outside ring on the tapered roller bearing
- ❑ For the differential.
- ❑ Removal ⇒ page 117
- ❑ Installation ⇒ page 117
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

17 - Adjustment pin
- ❑ 2 units.

18 - Transmission case
- ❑ Manufactured in aluminum.
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty -AMV 188 200 03- Evenly on the sealing surface of the transmission case.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

19 - Oil draining screw (plug)
- ❑ 25 Nm.

20 - Sealing ring for the left propelling flange
- ❑ Replace with the transmission installed ⇒ page 107 .

21 - Transmission rotation sensor -G182-
- ❑ Remove and install ⇒ page 21

22 - Screw
- ❑ 5 Nm + 90°.
- ❑ Replace whenever removed.

23 - O-ring
- ❑ Replace whenever removed.

24 - Bushing
- ❑ For the selector lever shaft.
- ❑ Removal ⇒ page 83
- ❑ Installation ⇒ page 83

25 - Magnet
- ❑ Fastened on the case surface.

26 - Circlip
- ❑ Install on the tapered roller bearing groove ➢ Item 28 (page 81) .

27 - Circlip
- ❑ Install on the tapered roller bearing groove ➢ Item 29 (page 82) .

28 - Tapered roller bearing
- ❑ For pinion shaft.

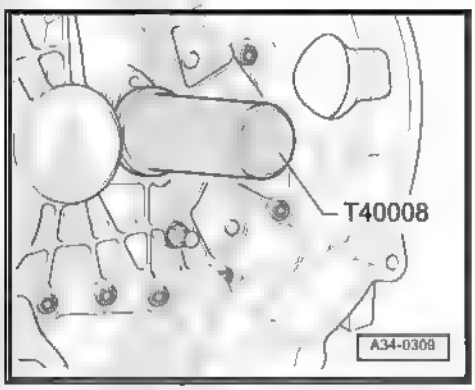
- ❑ Removal → page 102
- ❑ Installation → page 102

29 - Tapered roller bearing

- ❑ For primary shaft
- ❑ Removal → page 93
- ❑ Installation → page 93

Installing the primary shaft's sealing ring

– Install sealing ring using the Pressure tube -T 40008- .

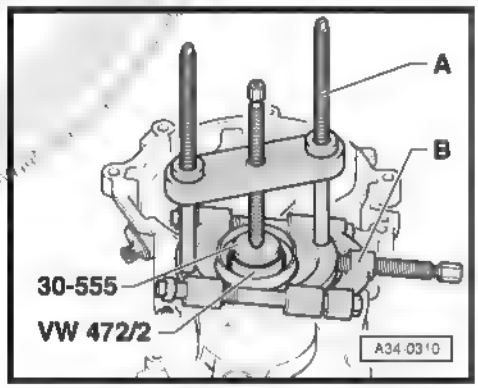


Removing the sealing ring bushing

– A Sleeve -VW 472/2- and Pressure Disc -30-555- , install on the differential.

-A- - Extractor 65 - 160 mm -KUKKO 18/1- .

-B- - Spacer 12 - 75 mm -KUKKO 17/1- .

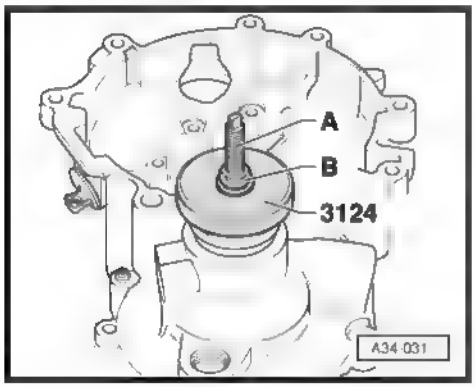


Installing the sealing ring bushing

A - Fasten the threaded shaft of the Mounting device -3066- to the threaded part in the differential.

B - M12 nut with washer.

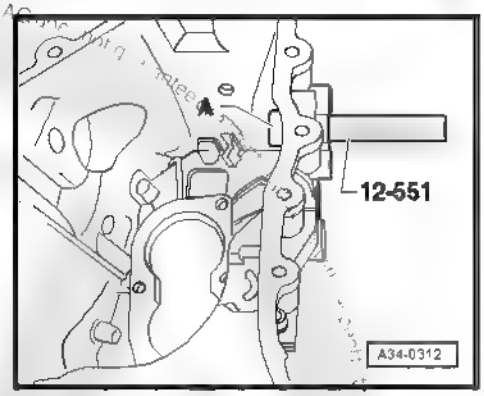
– Install the bushing to the stop with Pressure plate -3124- ,by turning nut -B-.



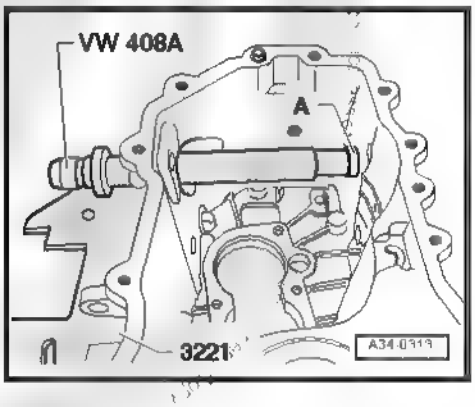
Note

With the transmission disassembled, press the bushing with Pressure plate -3124- to the stop.

Removing the bushing for the selector lever shaft -A-



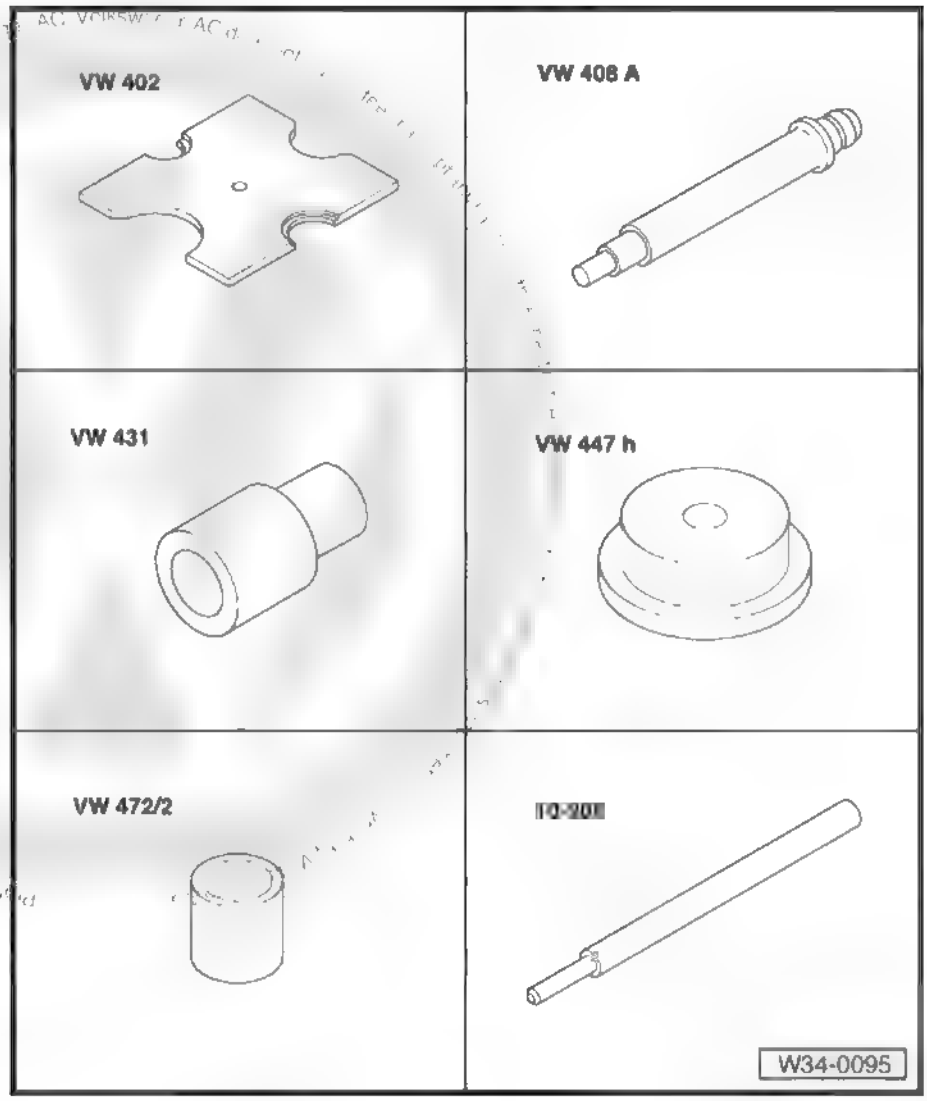
Installing the bushing for the selector lever shaft -A-



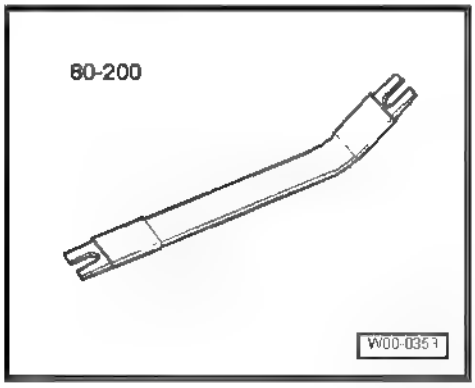
11 Selection forks - disassemble and assemble

Special tools and workshop equipment required

- Thrust plate -VW 402-
- Pressure pin -VW 408A-
- Thrust pad -VW 431-
- Thrust pad -VW 447H-
- Sleeve -VW 472/2-
- Pin or VW 010-206 -10-206-

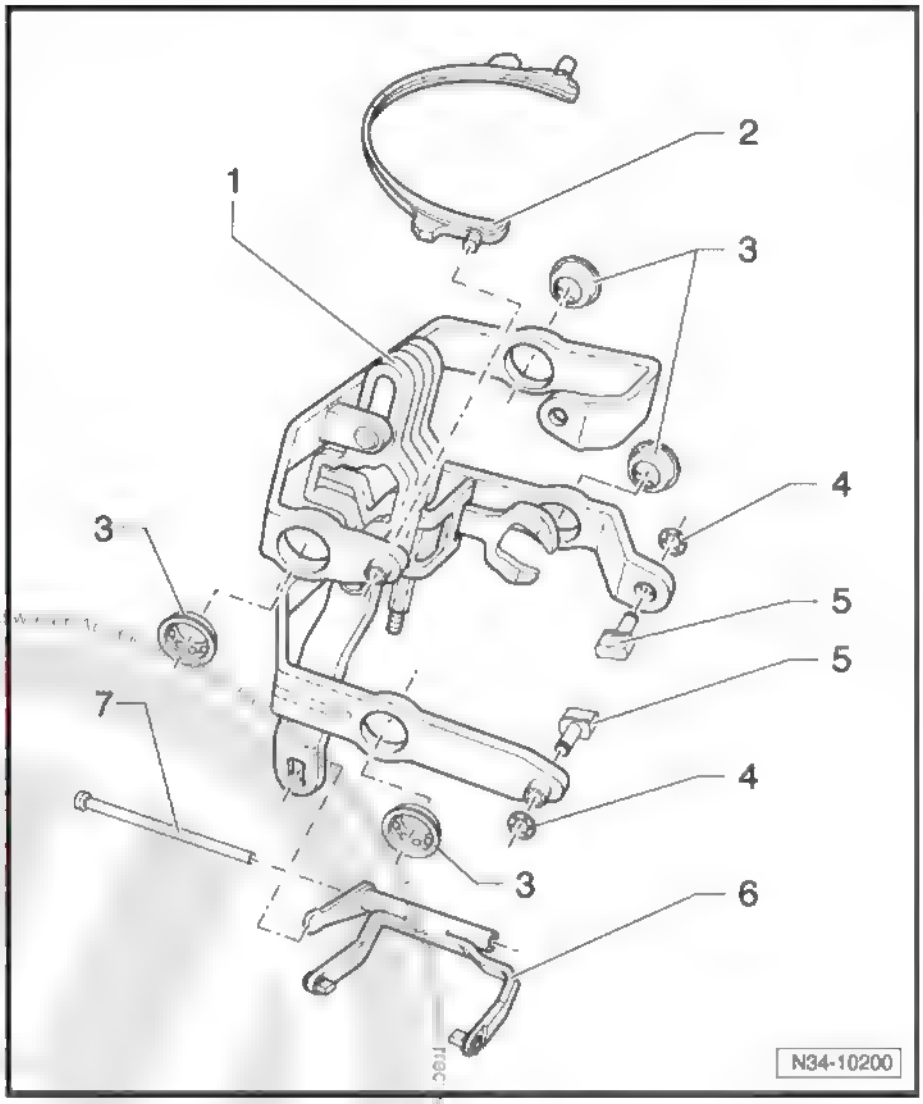


- Ejector lever -80-200-



Note

To remove or install the selector segments (skids), circlips and ball bearings, you are not required to remove the change rail set.



1 - Change rail set with selector forks

2 - Selector segment 3nd./ 4nd. gear

- ❑ Identification ➢ page 86
- ❑ After assembling, it shall move freely.
- ❑ Individual selector segments are mounted in some transmissions ⇒ page 86
- ❑ Identification of individual segments ⇒ page 86

3 - Ball bearing

- ❑ 4 units.
- ❑ Removal ⇒ page 87
- ❑ Installation ⇒ page 87

4 - Circlip

- ❑ Replace whenever removed.
- ❑ Removal ⇒ page 87
- ❑ Installation ⇒ page 87

5 - Selector segment 1nd./ 2nd. gear

- ❑ Identification ⇒ page 86
- ❑ After assembling, it shall move freely.

6 - Selector fork for 5nd. gear with selector segment

- ❑ The selector segments should not be removed from the selector fork.
- ❑ Identification ⇒ page 86

7 - Bearing pin

- ❑ For the selector fork for 5nd. gear wheel.

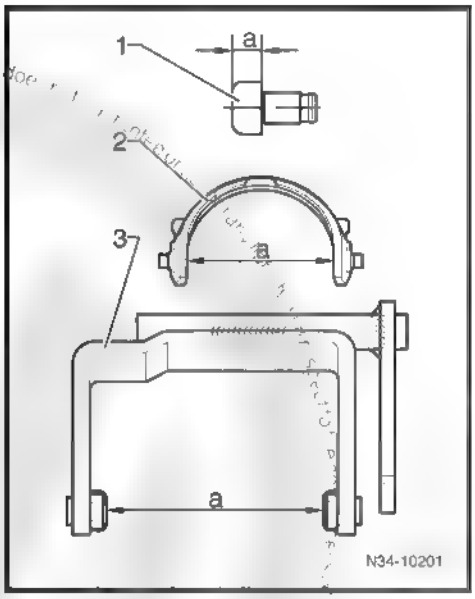
Identification of the selector segments in the 5th gear selector fork, including the selector segments for 1_{nd}./2_{nd}. and 3_{nd}./4_{nd}. gear

Measurement -nd-:

1 - Selector segments 1_{nd}./2_{nd}. gear = 10.2 mm

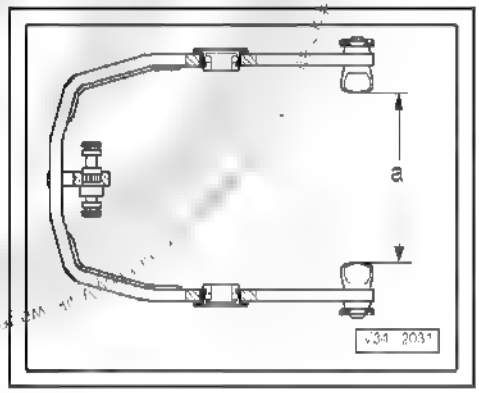
2 - Selector segment 3_{nd} /4_{nd}. gear = 78 6 mm

3 - Selector fork for 5_{nd} gear, including the selector segments = 79.5 mm



Selector fork for 1_{nd}./2_{nd}. gear including selector segments

Measurement -nd- = 75 mm.

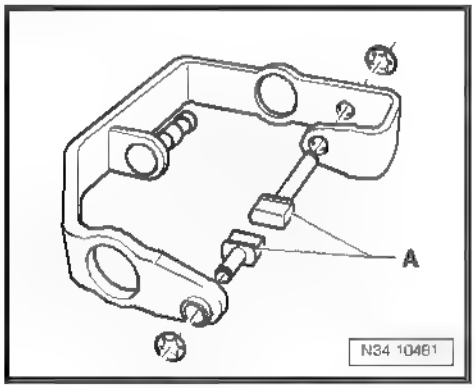


Individual selector segments 3_{nd}./4_{nd}. gear -A-

After assembling the gear selector segments, they shall move freely.

Note

Only some transmissions have these individual segments.



Identification of the individual selector segments for 3_{nd}./4_{nd}. gear

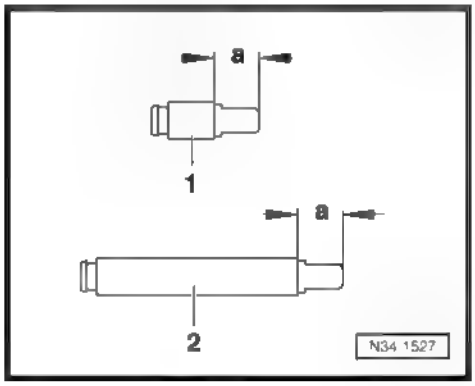
Measurement -nd-:

1 - Short selector segment 3_{nd}./4_{nd}gear = 10.2 mm

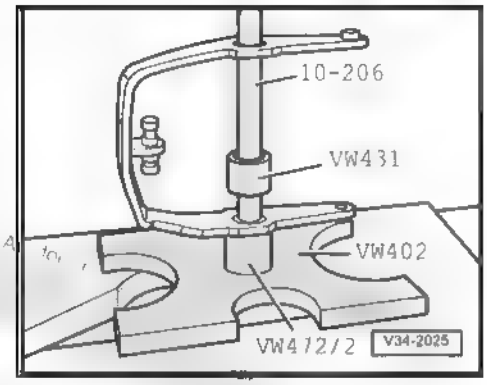
2 - Long selector segment 3_{nd} /4_{nd} gear = 10.2 mm

Note

When removing or installing internal tracks, do not twist the selection forks



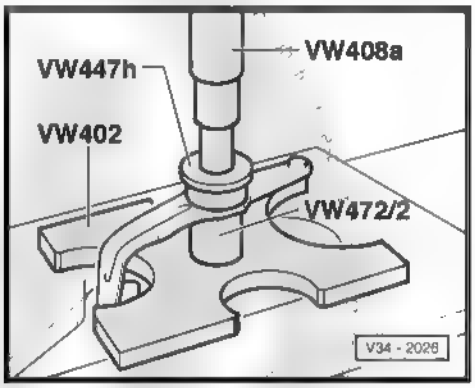
Removing ball bearing



Note

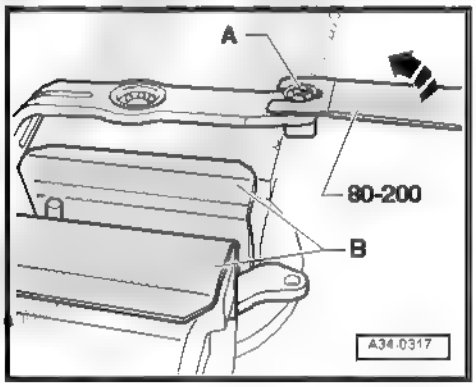
When removing or installing internal tracks, do not twist the selection forks

Installation ball bearing



Removing circlip

- Fasten the selection forks to the vise with jaw -B-.
- Remove the circlip -A- by leveraging towards the arrow.

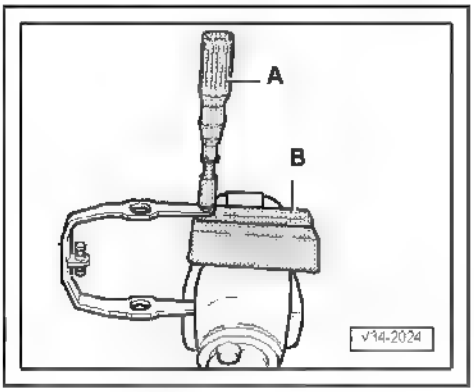


Installing circlip

A - Barrel wrench 10

B - Jaw

- Press the circlip on the fork segment groove by using a barrel wrench.



Note

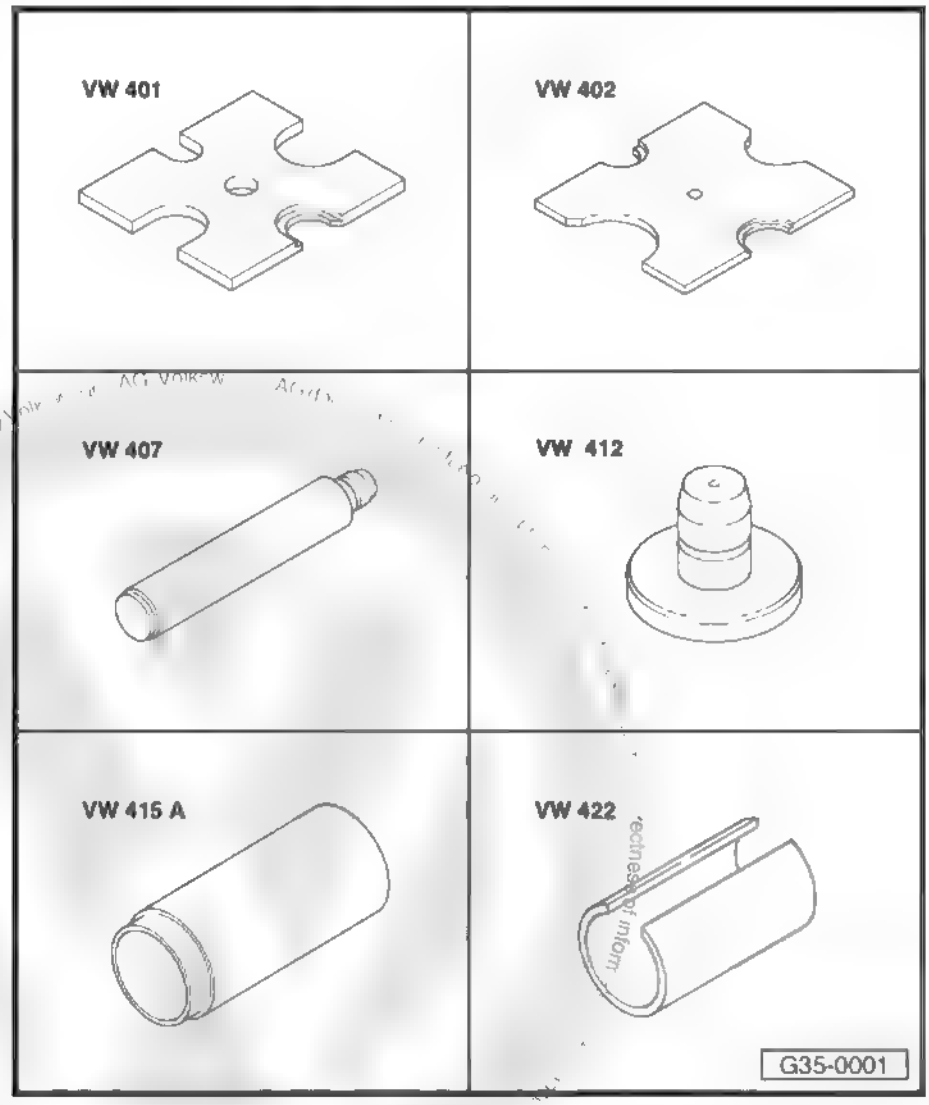
After installing the circlip, the fork segment shall move freely.

35 – Gears and shafts

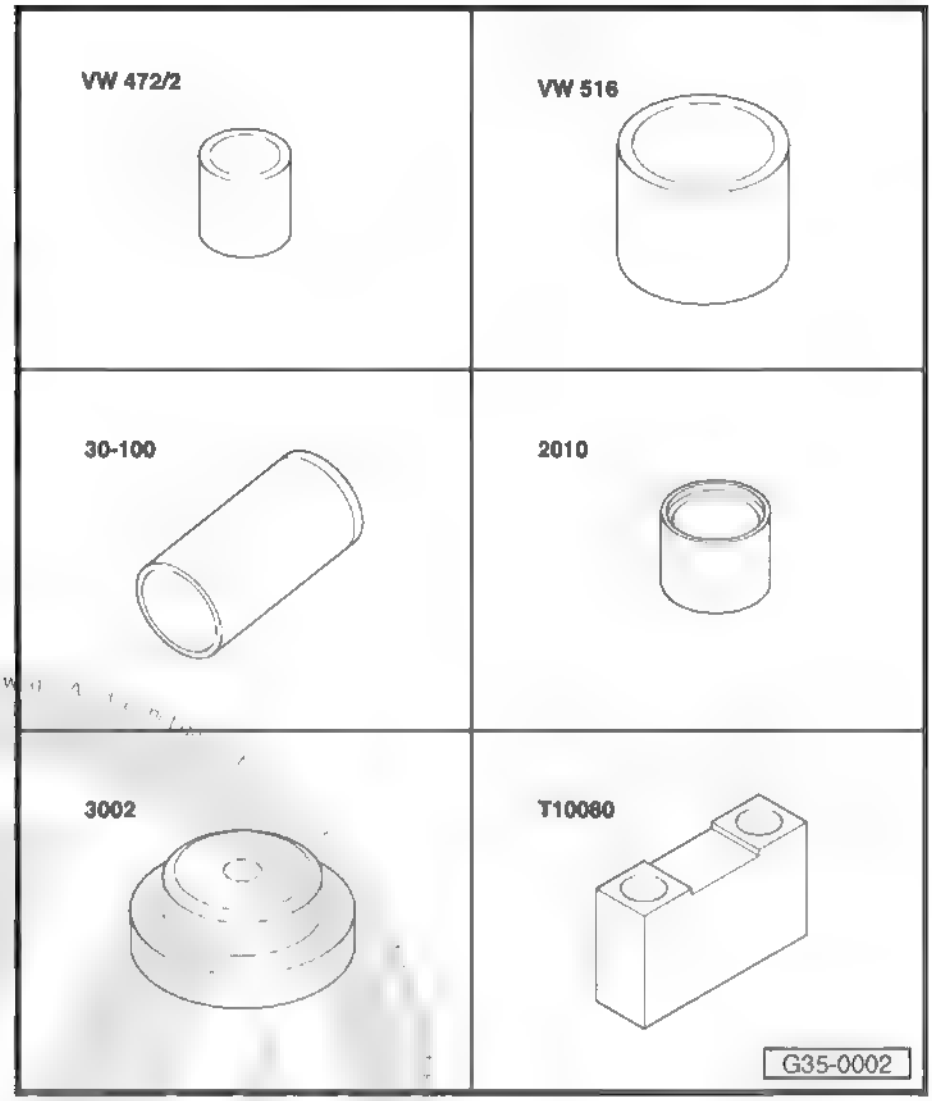
1 Primary shaft - disassemble and assemble

Special tools and workshop equipment required

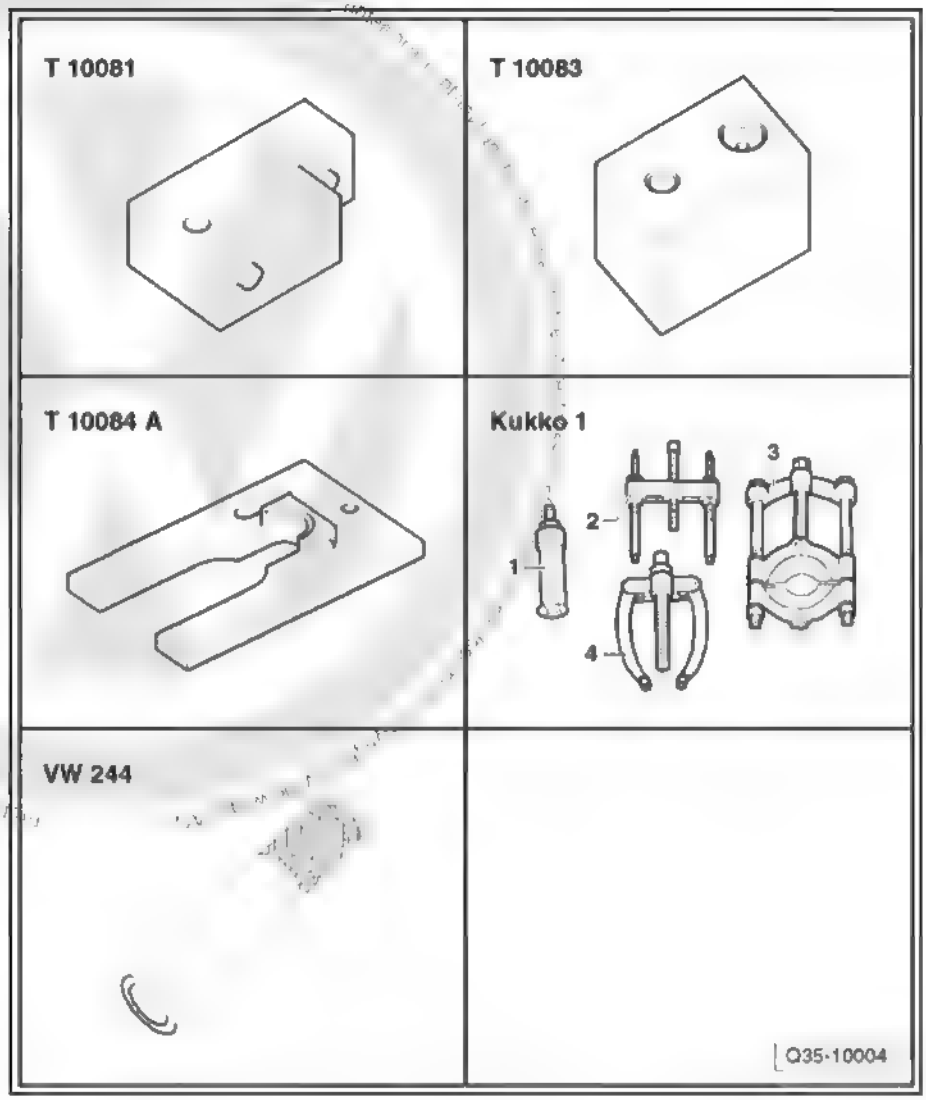
- Thrust plate -VW 401-
- Thrust plate -VW 402-
- Pressure pin -VW 407-
- Pressure Disc -VW 412-
- Pressure tube -VW 415A-
- Pressure tube -VW 422-



- Sleeve -VW 472/2-
- Tube -VW 516-
- Tube -30-100-
- Tube -2010-
- Pressure base or VW 3002 -3002-
- Pressure shim -T 10080-

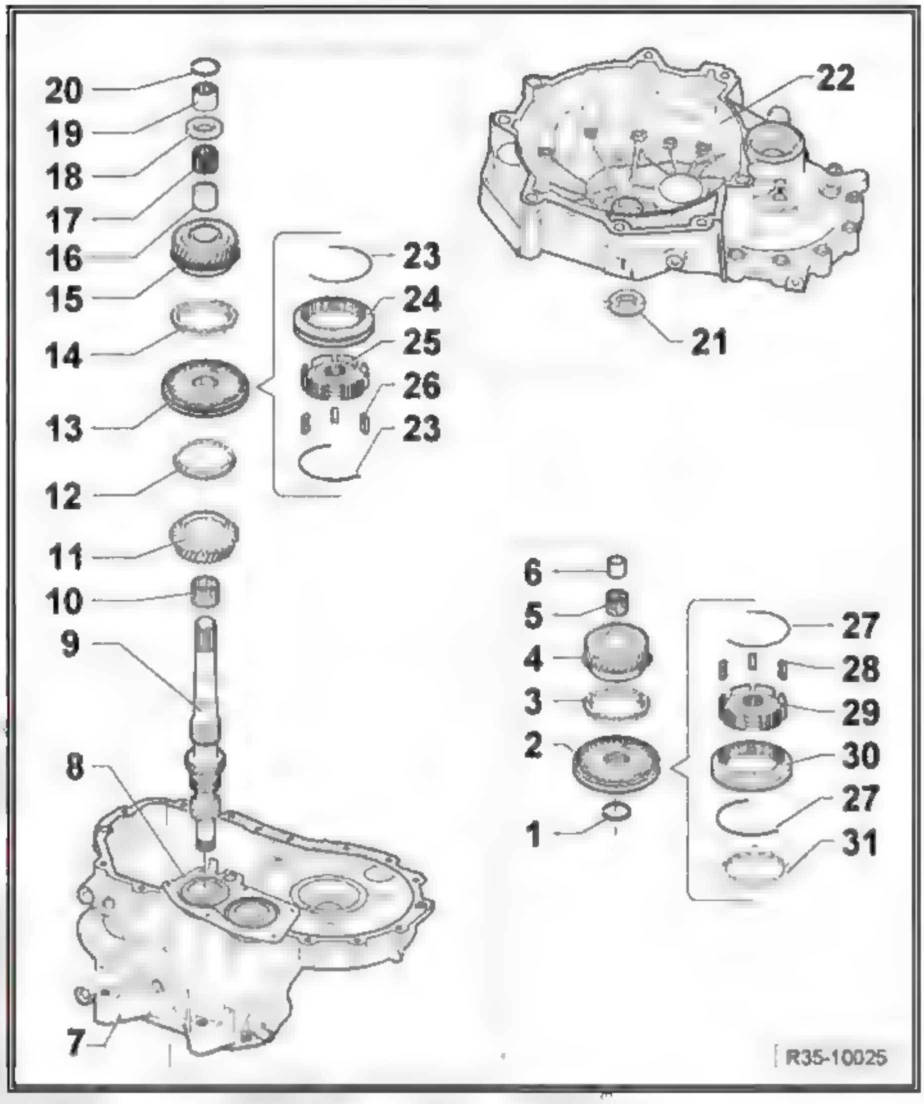


- Pressure shim -T 10081-
- Pressure shim -T 10083-
- Pressure plate -T 10084A-
- -1- Puller 30 - 37 mm or VW 020P -Kukko 21/5-
- -2- Extractor 65 - 160 mm - KUKKO 18/1-
- -3- Spacer 12 - 75 mm - KUKKO 17/1-
- -4- Auxiliary support -KUKKO 22/1-
- Fitting tool -VW 244-



Note

- *When installing new gears, refer to technical data ⇒ page 1 .*
- *Install all the roller bearings, gears and synchronizer rings on the primary shaft, lubricated with gear oil.*
- *Do not invert the synchronizer rings. When reusing synchronizer rings, always install them on the same gear pair*



1 - Circlip

- ❑ Replace whenever removed.
- ❑ Determine thickness ⇒ page 77 .

2 - Engaging sleeve with 5nd. gear

- ❑ Disassemble and assemble ⇒ page 97

3 - Synchronizer ring for 5nd. gear

- ❑ Wear check ⇒ page 95

4 - Gear for the 5nd. gear

5 - Needle roller bearing

- ❑ For the 5nd. gear wheel.
- ❑ Change with bushing ⇒ Item 6 (page 91) .

6 - Bushing

- ❑ For the 5 th gear needle bearingnd. gear wheel.
- ❑ Change with roller bearing ⇒ Item 5 (page 91) .
- ❑ Remove with ball bearing support ⇒ page 93
- ❑ Installation ⇒ page 96

7 - Transmission case

- ❑ Manufactured in aluminum.
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface of the transmission case.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

8 - Roller bearing support with ball bearing

- ❑ Change roller bearing support with ball bearing.
- ❑ Clean the threaded holes of the roller bearing support (e.g. Tap M6).
- ❑ Removal ⇒ page 93
- ❑ Installation ⇒ page 96

9 - Primary shaft

10 - Needle roller bearing

- ❑ For the 3nd. gear wheel.

11 - Gear for the 3nd. gear

12 - Synchronizer ring for 3nd. gear

- ❑ Wear check ⇒ page 95

13 - Engaging sleeve with 3nd. and 4nd. gear

- ❑ Remove with 3nd. gear ⇒ page 94
- ❑ Disassemble and assemble ⇒ page 94

- ❑ Installation position of the engaging sleeve/synchronizer ring ⇢ page 94
- ❑ Installation ⇢ page 95

14 - Synchronizer ring for 4nd. gear

- ❑ Wear check ⇢ page 95

15 - Gear for the 4nd. gear

16 - Bushing

- ❑ For 4 th gear needle roller bearing4nd. gear wheel.
- ❑ Change with needle roller bearing ⇢ Item 17 (page 92) .
- ❑ Remove with 3nd. gear ⇒ page 93
- ❑ Installation ⇒ page 95

17 - Needle roller bearing

- ❑ For the 4nd. gear
- ❑ Change with bushing ⇒ Item 16 (page 92)

18 - Sealing washer

19 - Inside ring on the tapered roller bearing

- ❑ Removal ⇒ page 93
- ❑ Installation ⇒ page 95

20 - Circlip

- ❑ Replace.
- ❑ Thickness determination ⇒ page 96

21 - Tapered roller bearing

- ❑ With circlip.
- ❑ Removal ⇒ page 93
- ❑ Installation ⇒ page 93
- ❑ Installation position: the bearing lock ring shall point to the input shaft.

22 - Clutch case

- ❑ Manufactured in aluminum.
- ❑ Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- ❑ Repair ⇒ page 78 .
- ❑ Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface of the transmission case.
- ❑ In case of replacement, always adjust differential ⇒ page 119 .

23 - Spring

- ❑ Installation position ⇒ page 94

24 - Engaging sleeve with 3nd. and 4nd. gear

25 - Synchronizer of 3nd. and 4nd. gear

26 - Retainers

- ❑ 3 units

27 - Spring

- ❑ Installation position ⇒ page 97

28 - Retainers

- ❑ 3 units

29 - Synchronizer of 5nd. gear

30 - Engaging sleeve with 5nd. gear

31 - Stop ring

- ❑ Prevent limiter "escape" of the locking pieces.

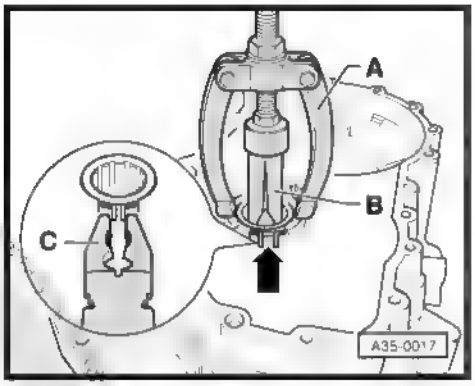
❑ Removal ➢ page 97
❑ Installation ➢ page 98

Removing tapered roller bearing on clutch case

A - Auxiliary support -KUKKO 22/1- .

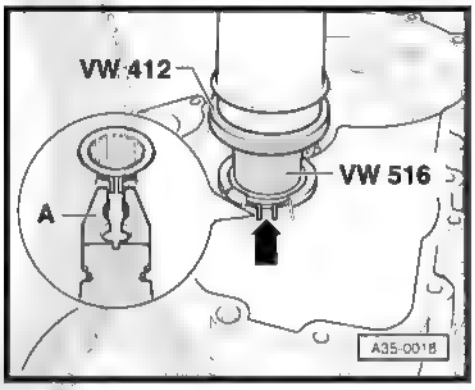
B - Puller 30 - 37 mm or VW 020P -Kukko 21/5-

– When removing it, compress the bearing circlip -arrow- with pliers -C-.



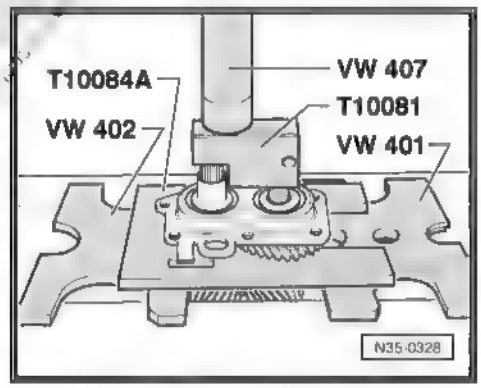
Installing tapered roller bearing on clutch case

– Support the clutch case by placing the Pressure tube -VW 415A- (does not appear in the pic.) directly under the bearing bracket.
– When installing, compress the bearing circlip -arrow- with pliers -A-.
– Remove the pliers just before the bearing is in the correct installation position. The circlip shall be locked in the clutch case hole.



Removing the bearing support with ball bearings

– Engage the 2nd. gear wheel.
– Push Pressure plate -T 10084A- laterally to the primary shaft stop.
– Install centering pins of the Pressure shim -T 10081- on the primary and pinion shaft holes.



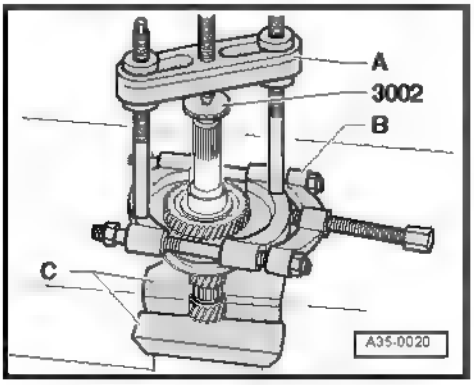
Removing the inside ring of the tapered roller bearing with the 4nd. gear

A - Extractor 65 - 160 mm -KUKKO 18/1-

B - Spacer 12 - 75 mm -KUKKO 17/1-

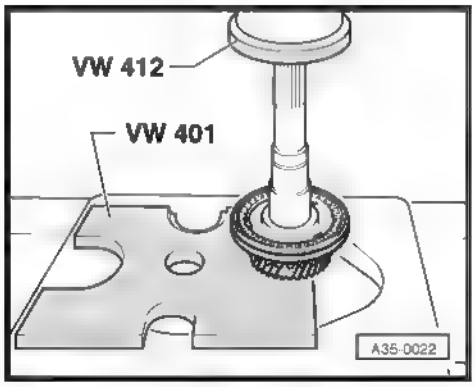
C - Protection shims

– Remove circlip first
– Fasten the Spacer 12 - 75 mm -KUKKO 17/1- -B- behind the helical teeth (not in the gear teeth) of 4nd. gear wheel.



Engaging sleeve with synchronizer of 3_{nd}. and 4_{nd} gear

– After removing the circlip, disengage with the moving wheel of the 3_{nd}. gear and the engaging sleeve with synchronizer.



Disassembling and assembling the 3rd gear engaging sleeve and synchronizer$_{nd}$. and 4_{nd}. gear

1 - Spring

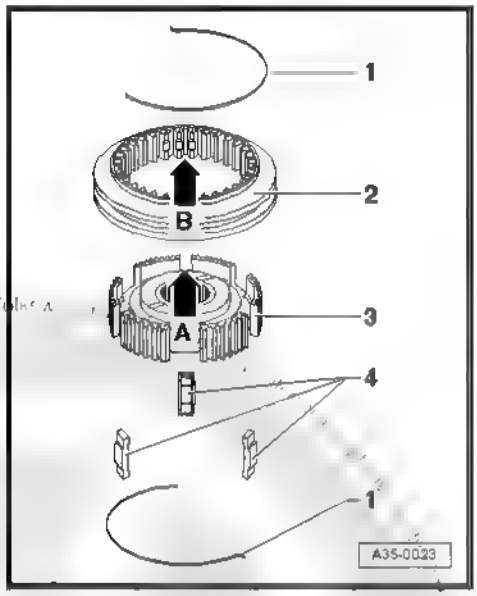
2 - Engaging sleeve

3 - Synchronizer

4 - Retainers

– Press the engaging sleeve on the synchronizer.

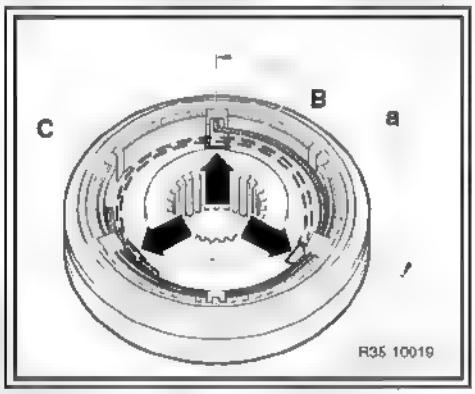
The deeper grooves -arrow A- for the limiters located on the synchronizer shall match the notches -arrow B- on the engaging sleeve.



– Install the limiters in the deeper grooves -arrows-.

• Press the engaging sleeve on the synchronizer.

– Install springs -B- and -C- displaced by -nd-.



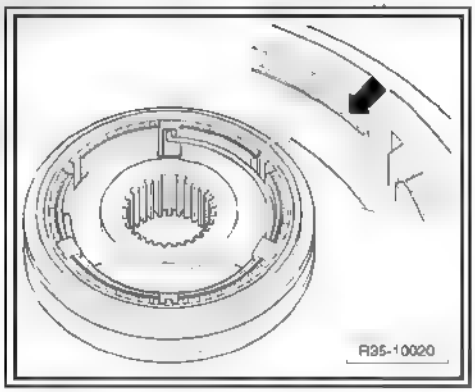
Note

-nd- = 120°

– The folded end of the spring shall fit into the limiter's hole.

Installation position locking collar/synchro hub of 3_{nd}. and 4_{nd}. gear

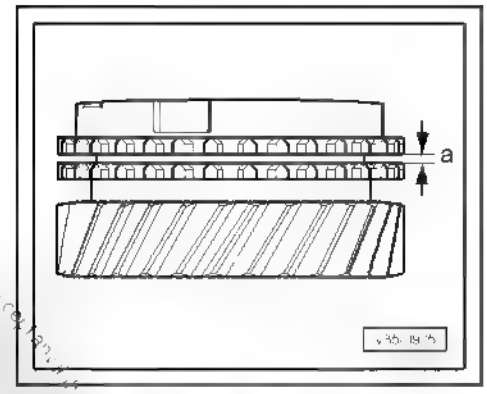
The front face notch -arrow- shall face the 4_{nd}. gear wheel.



Checking the wear on the synchronizer ring

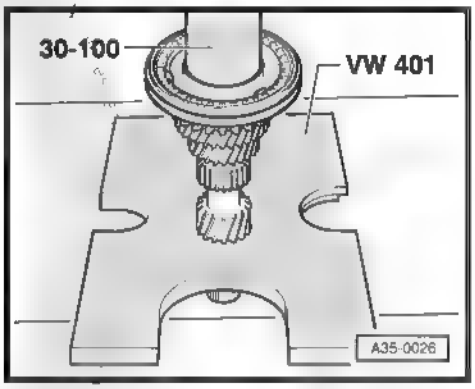
– Press the synchronizer ring against the gear cone and measure the distance -nd- with a feeler gauge

Distance -nd-	New part	Wear limit
3_{nd}., 4_{nd}. and 5_{nd} gear	1.1...1.7 mm	0.6 mm



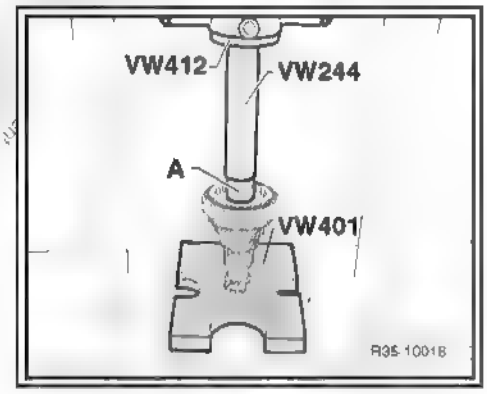
Installing synchronizer with the engaging sleeve of 3_{nd}. and 4_{nd}. gear

– When pressing, secure the 3_{nd}. wheel gear with the synchronizer ring fitted in the engaging sleeve/synchronizer of the 3_{nd}. and 4_{nd}. gears

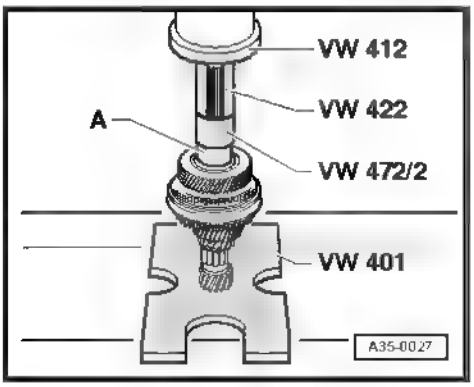


Installing the bushing on the needle bearing of 4_{nd}. gear -A-

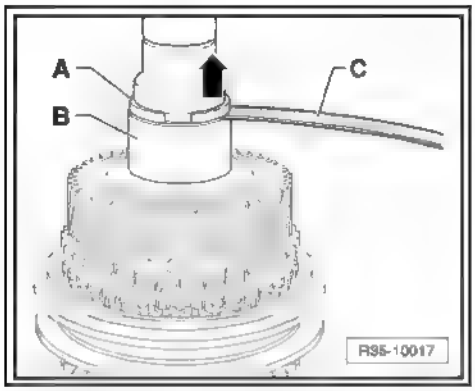
– Install 4_{nd}. gear wheel.



Installing the inside ring on the tapered roller bearing -A-



Determination of the circlip thickness



- Install a circlip with 2.0 mm thickness -A- in the primary shaft groove and press upwards -arrow-
- Determine the distance between the inside ring -B- and the circlip installed -A- by using a feeler gauge -C-
- Remove the circlip used for measurement.
- Use the table to determine the circlip to be installed.

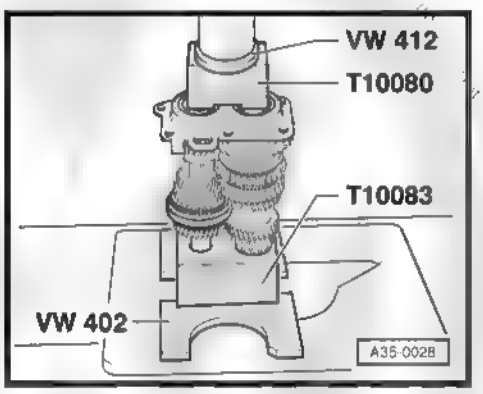
Note

Request circlips by ⇒ Electronic Parts Catalogue (ETKA).

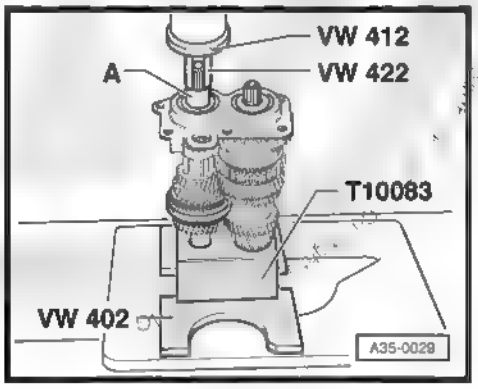
Circlips available

Value measured (mm)	Circlip thickness (mm)	Axial clearance (mm)
0,05 ... 0,10	2,0	0,05 ... 0,15
0,15 ... 0,20	2,1	0,05 ... 0,15
0,25 ... 0,30	2,2	0,05 ... 0,15
0,35 ... 0,40	2,3	0,05 ... 0,15
0,45 ... 0,50	2,4	0,05 ... 0,10

Installing the bearing support with ball bearings

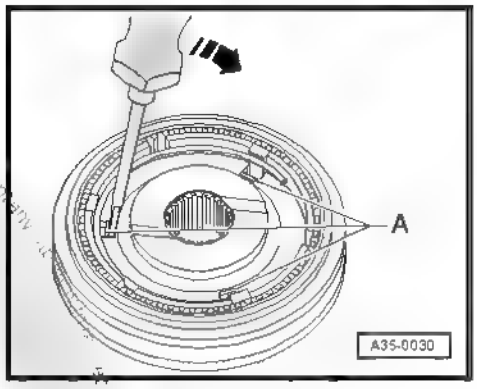


Installing the bushing -A- for 5 th gear needle roller bearing 2nd gear



Removing the stop ring

– Disengage hooks -A- from the stop ring with a screwdriver



Disassembling and assembling the 5 th gear engaging sleeve and synchronizer$_{nd}$. gear

1 - Spring

2 - Retainers

3 - Synchronizer

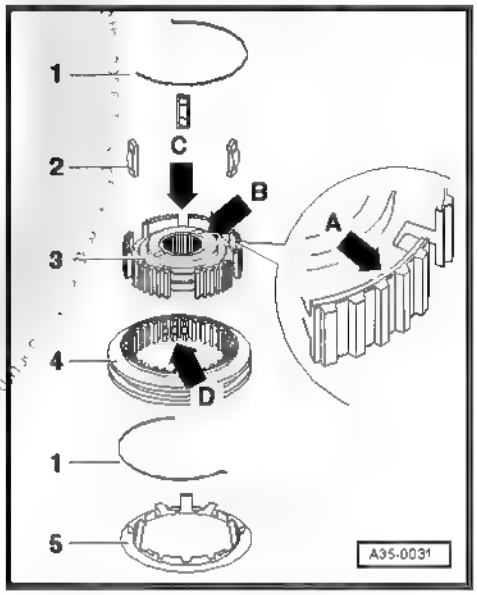
- Installation position: the front face groove -arrow A- and the wide collar -arrow B- shall face the 5$_{nd}$. gear wheel.

4 - Engaging sleeve

5 - Stop ring

– Press the engaging sleeve on the synchronizer.

The deeper grooves -arrow C- for the limiters located on the synchronizer shall match the notches -arrow D- on the engaging sleeve.



– Install the limiters in the deeper grooves -arrows-.

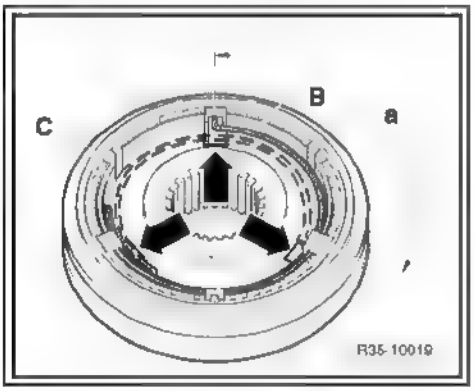
• Press the engaging sleeve on the synchronizer

– Install springs -B- and -C- displaced by -nd-

Note

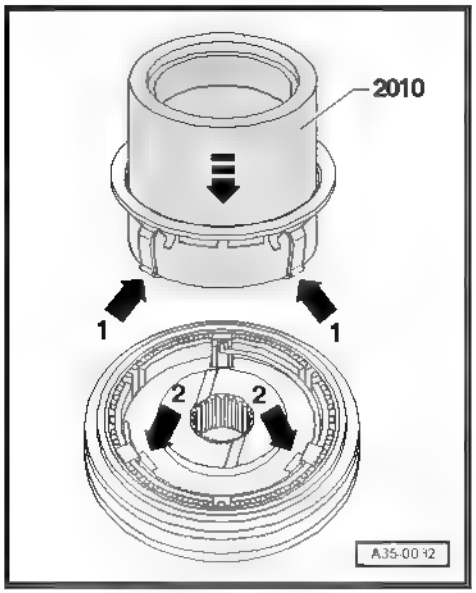
-nd- = 120°.

– The folded end of the spring shall fit into the limiter's hole.



Installing stop ring

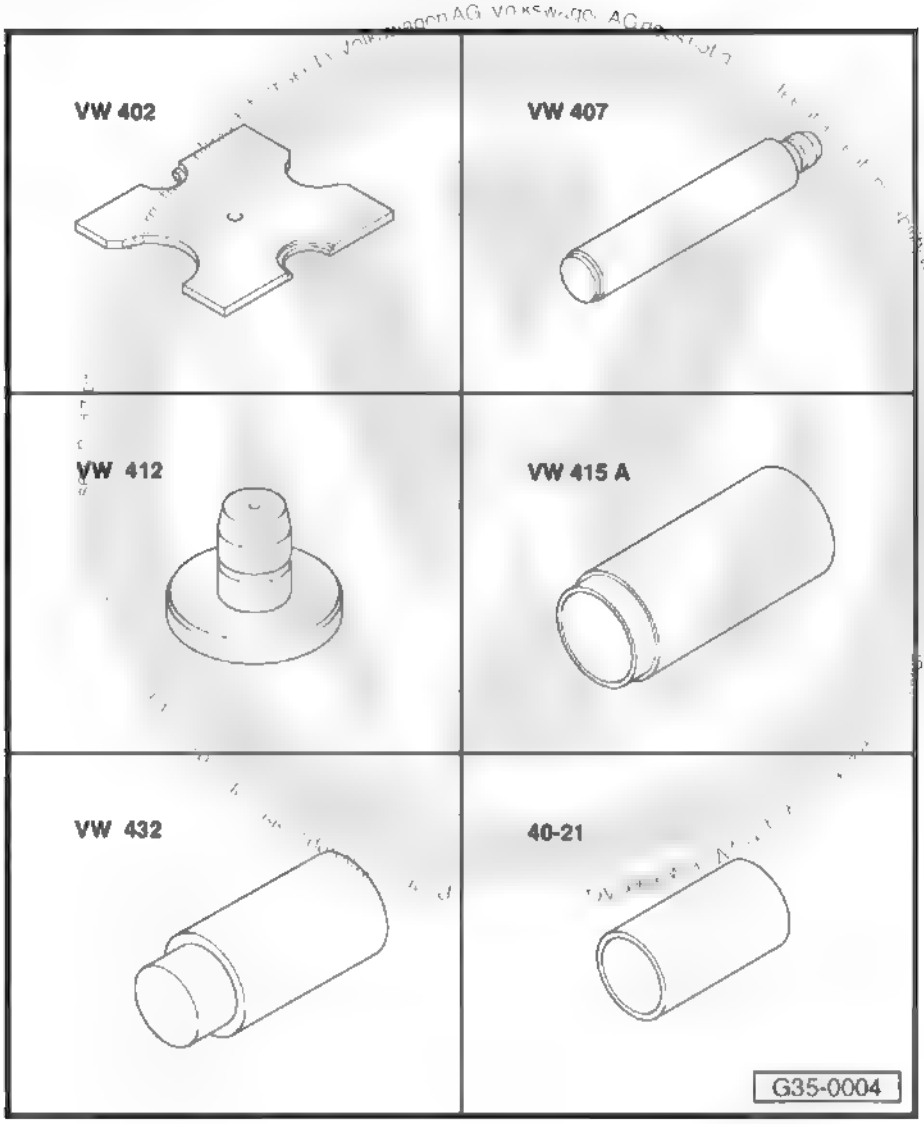
- Fit the ring in Tube -2010- .
- Introduce the Tube -2010- with the synchronizer for 5_{nd}. gear observing correct installation position. The hooks -arrow 1- shall fit in the notches -arrow 2- of the synchronizer limiters
- Press the stop ring downwards until locking the hooks.



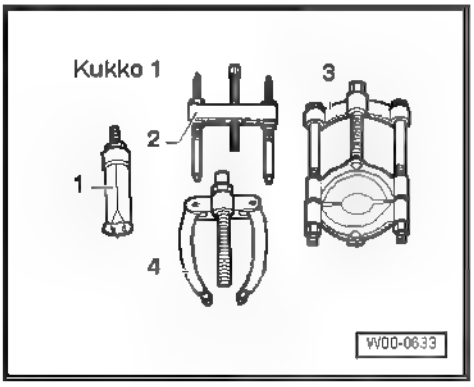
2 Pinion shaft - disassemble and assemble

Special tools and workshop equipment required

- Thrust plate -VW 402-
- Pressure pin -VW 407-
- Pressure Disc -VW 412-
- Pressure tube -VW 415A-
- Thrust pad -VW 432-
- Support tube -40-21-

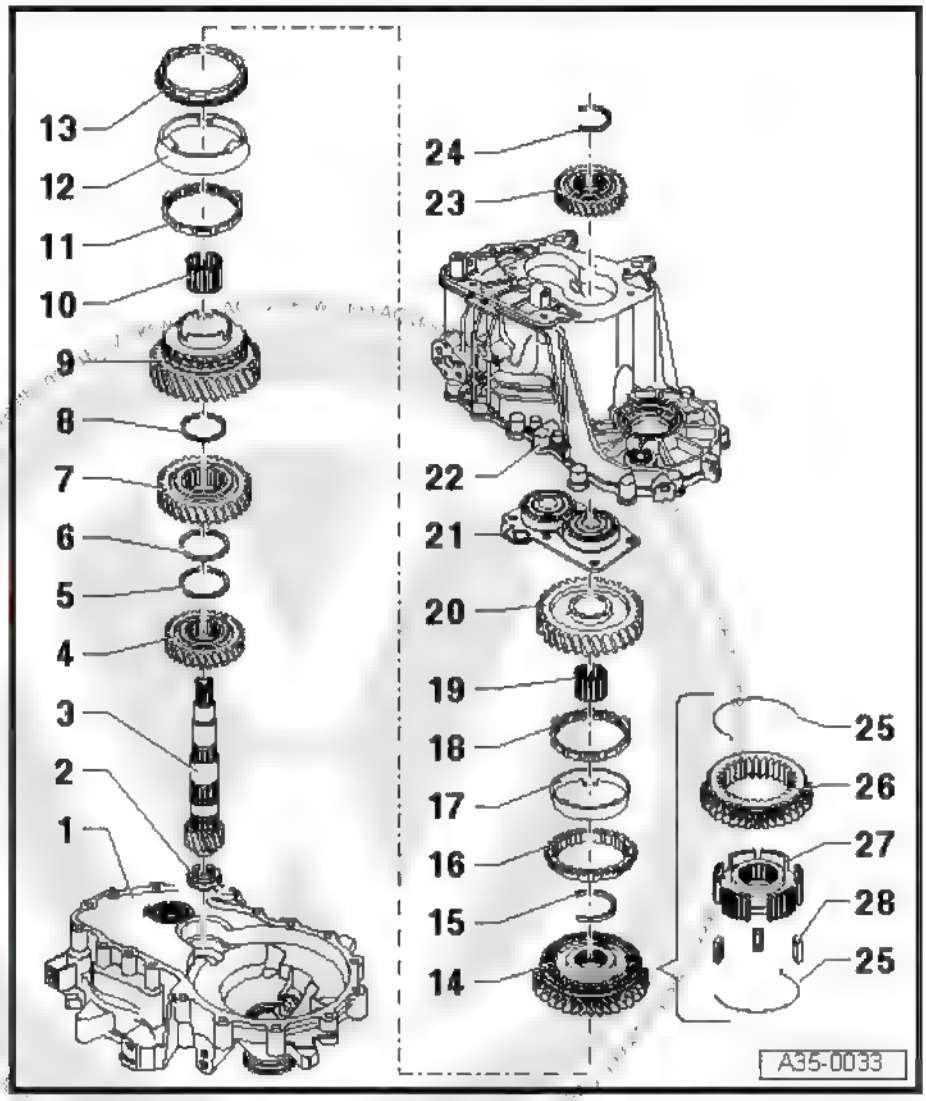


- -1- Puller 30 - 37 mm or VW 020P -Kukko 21/5-
- -4- Auxiliary support -KUKKO 22/1-



Note

- *When installing new gears or a new pinion shaft, refer to technical data ⇒ page 1 .*
- *Install all the roller bearings, gears and synchronizer rings on the primary shaft, lubricated with gear oil.*
- *Do not invert the synchronizer rings. When reusing synchronizer rings, always install them on the same gear pair.*



1 - Clutch case
- Manufactured in aluminum.
- Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- Repair ⇒ page 78 .
- Apply the Sealing putty - AMV 188 200 03- evenly on the sealing surface of the transmission case.
- In case of replacement, always adjust differential ⇒ page 119 .

2 - Tapered roller bearing
- With circlip.
- Removal ⇒ page 102
- Installation ⇒ page 102
- Installation position: the lock ring shall point to the direction of the pinion shaft.

3 - Pinion shaft
- If it is necessary to replace the pinion shaft, the differential master gear shall also be replaced ⇒ Item 16 (page 115) .
- If there is an inside ring as tapered roller bearing housing, this should not be removed from the pinion shaft.
- If scratches or damages are detected on the roller bearing housing or inside ring, replace the pinion shaft and the tapered roller bearing as a set.

4 - Gear for the 4nd. gear
- Installation position: the hub must point to the 3nd. gear ⇒ page 103

5 - Circlip

6 - Circlip

7 - Gear for the 3nd. gear
- Installation position: the hub must point to the 4nd. gear ⇒ page 103

8 - Circlip

9 - Gear for the 2nd. gear

10 - Needle roller bearing
- For the 2nd. gear wheel.

11 - Inside ring for 2nd. gear
- Wear check ⇒ page 103
- Installation position ⇒ page 104

12 - Outside ring for 2nd. gear
- Install on inside ring ⇒ Item 11 (page 101) .
- Change in case of scratches or wear signs.
- Installation position ⇒ page 104

13 - Synchronizer ring for 2nd. gear
- Wear check ⇒ page 103
- Installation position ⇒ page 104

14 - Engaging sleeve with with the synchronizer for 1nd. and 2nd. gear
- Remove with 2nd. gear wheel after removing the circlip ⇒ page 103
- Disassemble and assemble the engaging sleeve/synchronizer ring ⇒ page 104
- Installation ⇒ page 105

15 - Circlip
- Removal ⇒ page 102
- Installation ⇒ page 105

16 - Synchronizer ring for 1nd. gear
- Wear check ⇒ page 103
- Install in order that the notches fit in the engaging sleeve limiters ⇒ Item 14 (page 101).

17 - Outside ring for 1nd. gear
- Install on synchronizer ring ⇒ Item 16 (page 101) .
- Installation position ⇒ page 105
- Change in case of scratches or wear signs.

18 - Inside ring for 1nd. gear
- Wear check ⇒ page 103
- Check the flanges for wear signs.
- Installation position ⇒ page 105

19 - Needle roller bearing
- For the 1nd. gear wheel.

20 - Gear for the 1nd. gear
- Installation position ⇒ page 106

21 - Roller bearing support with ball bearing
- Change roller bearing support with ball bearing.
- Clean the threaded holes of the roller bearing support (e.g. Tap M6).
- Removal ➢ page 93
- Installation ➢ page 96

22 - Transmission case
- Manufactured in aluminum.
- Allocation ➢ Electronic Parts Catalogue (ETKA) .
- Repair ➢ page 78 .

- ❑ Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface of the transmission case.
- ❑ In case of replacement, always adjust differential ⇢ page 119 .

23 - Gear for the 5nd. gear

- ❑ Installation position: the hub must point to the side of the gearbox housing ⇢ page 76

24 - Circlip

- ❑ Always replace
- ❑ Determine thickness ⇢ page 77 .

25 - Spring

- ❑ Installation position ⇒ page 104

26 - Engaging sleeve

27 - Synchronizer

28 - Retainers

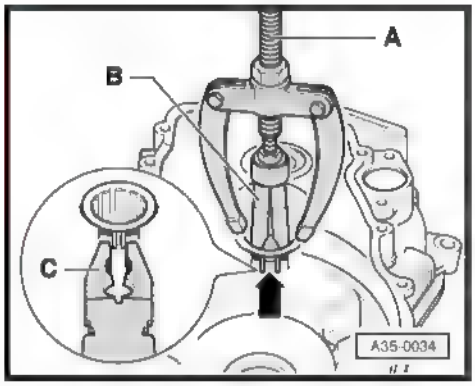
- ❑ 3 units.

Removing tapered roller bearing on clutch case

A - Auxiliary support -KUKKO 22/1- .

B - Puller 30 - 37 mm or VW 020P -Kukko 21/5- .

– When removing it, compress the bearing circlip -arrow- with pliers -C-.

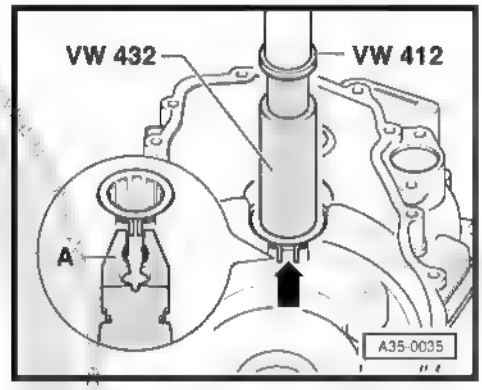


Installing the tapered roller bearing on clutch case

– Support the clutch case by placing the Pressure tube -VW 415A- (does not appear in the pic.) directly under the bearing bracket.

– When installing, compress the bearing circlip -arrow- with pliers -A-.

– Remove the pliers just before the bearing is in the correct installation position. The circlip shall be locked in the clutch case hole.



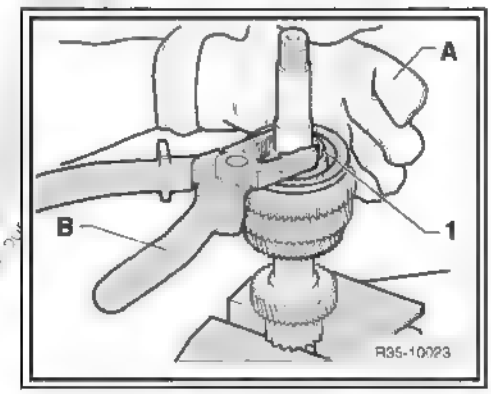
Removing circlip -1- from notch

A - Safety sleeve.

B - Multi-purpose pliers.

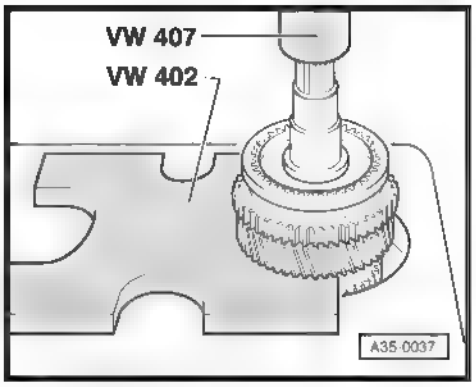
WARNING

Avoid uncontrolled motions of circlip.



Removing the locking collar/synchro hub of the 1nd. and 2nd gear

– After removing the circlip, disengage with the moving wheel of the 2nd. gear and the engaging sleeve with synchronizer.



Installation position of 3nd. and 4nd. gear

– Install 4nd. gear -A- on pinion shaft.

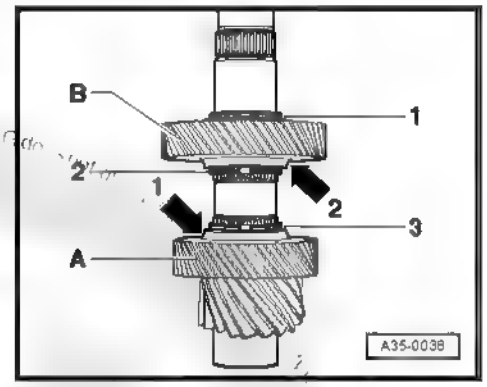
The collar -arrow 1- shall face the 3nd. gear -B-.

– Install circlips -2- and -3-.

– Install 3nd. gear -B- on pinion shaft.

The hub -arrow 2- shall face the 4nd. gear -A-.

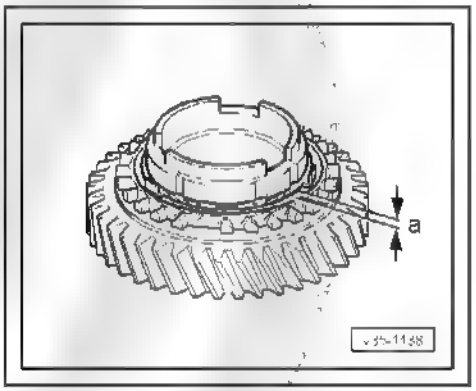
– Install circlip -1-.



Checking the wear on the synchronizer ring of 1nd. and 2nd. gear

– Press the inside ring against the gear cone and measure the distance -nd- with a feeler gauge.

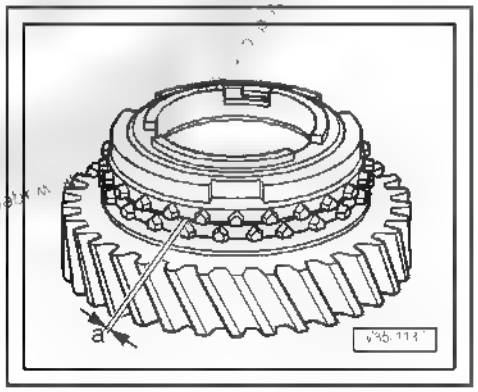
Distance -nd-	New part	Wear limit
1 and 2nd gear	0.75 ... 1.25 mm	0.3 mm



Checking the wear on the synchronizer ring of 1nd. and 2nd. gear

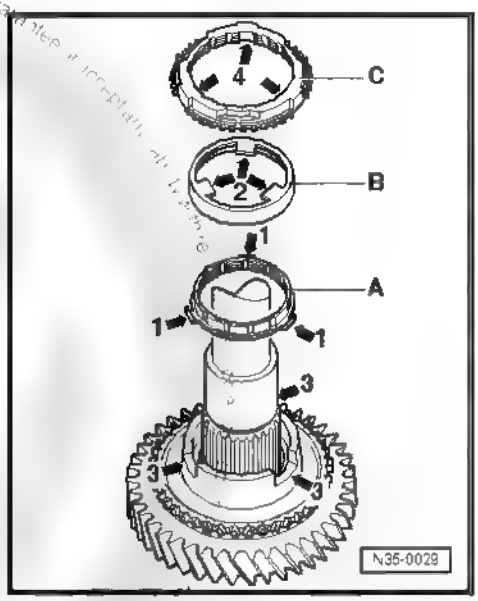
– Press the synchronizer ring, internal and external tracks against the gear cone and measure the distance -nd- with a feeler gauge

Distance -nd-	New part	Wear limit
1nd. and 2nd. gear	1,2 ... 1.8 mm	0.5 mm



Installation position of the outside and inside rings of the 2nd. gear

– Install inside ring -A- on the 2nd gear wheel. The curve shoulders -arrow 1- shall face the outside ring -B-
– Install the outside ring over -B-. The flanges -arrow 2- shall fit in the grooves -arrow 3- of the gear.
– Install the synchronizer ring over -C-. The grooves -arrow 4- shall fit in the relieves -arrow 1- on inside ring -A-



Disassembling and assembling engaging sleeve with 1nd. and 2nd. gear

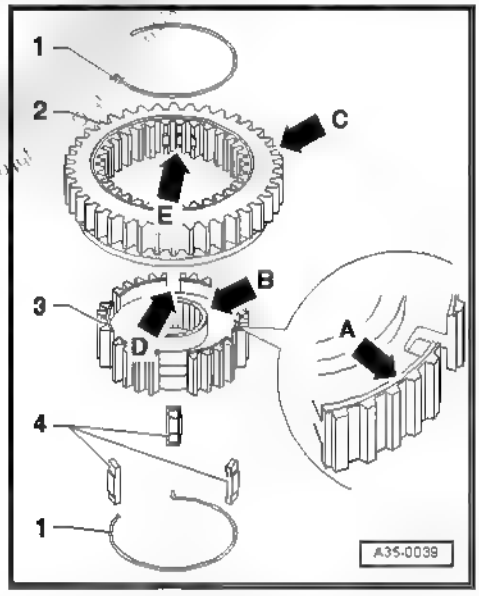
1 - Spring
2 - Engaging sleeve
3 - Synchronizer
4 - Limiter

– Press the engaging sleeve on the synchronizer.

The notch on front face -arrow A- and the wide collar -arrow B- shall face the external teeth on the engaging sleeve -arrow C- after installing.

The deeper grooves -arrow D- for the limiters located on the synchronizer shall match the notches -arrow E- on the engaging sleeve.

– Install the limiters in the deeper grooves -arrows-.



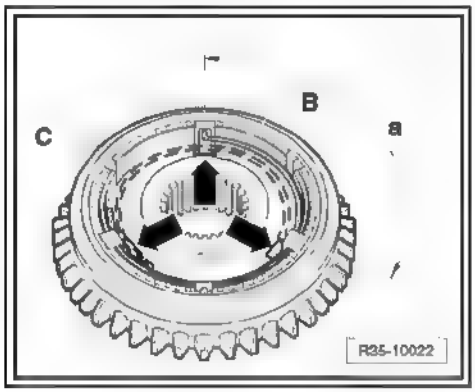
Assembly of the locking collar/synchro hub of the 1nd. and 2nd. gear

- Press the engaging sleeve on the synchronizer.
– Install the limiters in the deeper grooves -arrows-.
– Install springs -B- and -C- displaced by -nd-.

Note

-nd- = 120°.

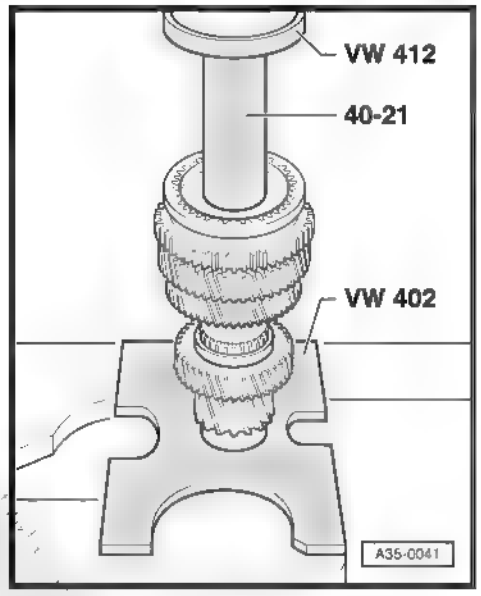
– The folded end of the spring shall fit into the limiter's hole.



Installation of the locking collar/synchro hub of the 1_{nd}. and 2_{nd}. gear

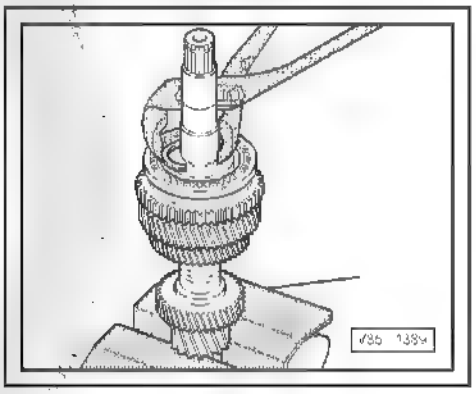
Installation position: The notch for the selection fork located on the engaging sleeve shall face the 1_{nd}. gear and the teeth for reverse gear towards 2_{nd}. gear wheel

– Turn the synchronizer ring in order to match flanges and limiters.



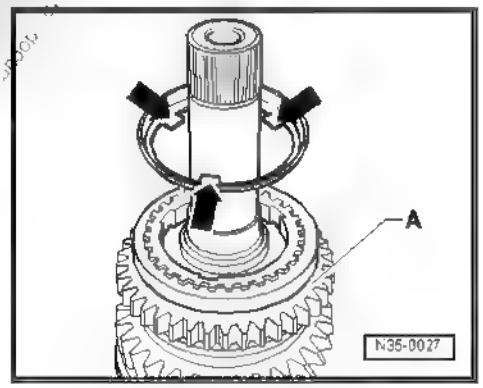
Installing circlip

– Install the 1_{nd}. gear circlip on the engaging sleeve/synchronizer.



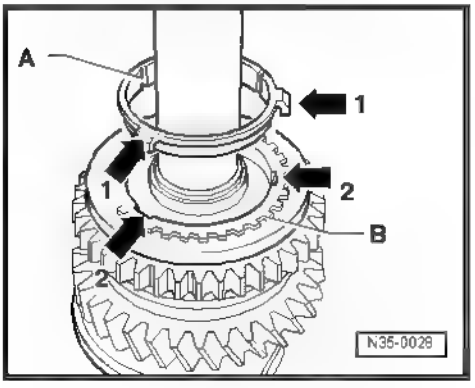
Installation position of the 1_{nd}. gear

The flanges -arrows- shall face the teeth for reverse gear.



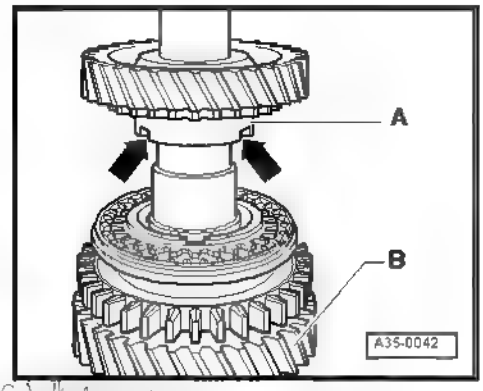
Installation position of the inside ring of the $_{nd}$. gear -A-

The flanges -arrow 1- fit in the notches -arrow 2- on synchronizer ring -B-



Installation position for 1_{nd}. gear

The tall collar -A- shall face the 2_{nd}. gear -B-. The collar notches -arrows- fit on the outside ring flanges -arrow-.



39 – Transmission shafts, differential

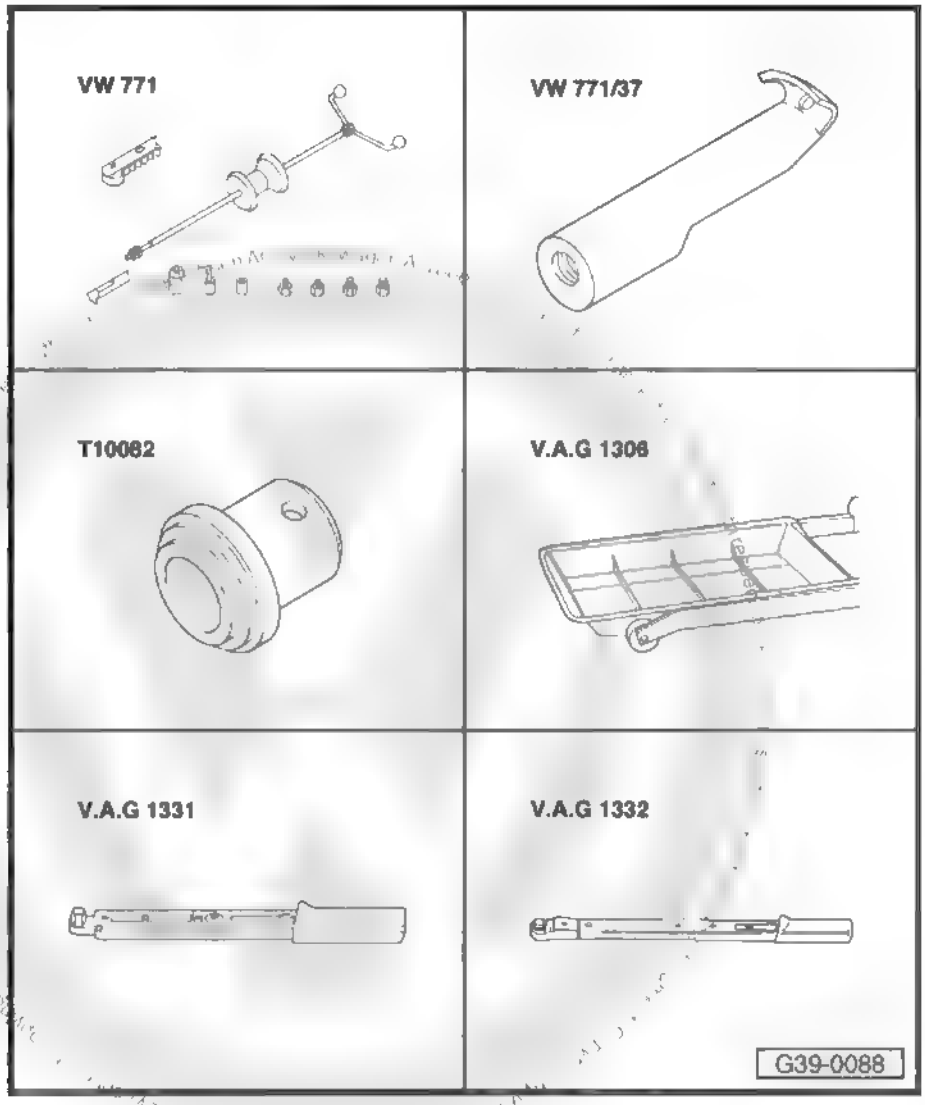
1 Retainer for the propelling flange - replace

(Transmission installed)

1.1 Left propelling flange retainer - replace

Special tools and workshop equipment required

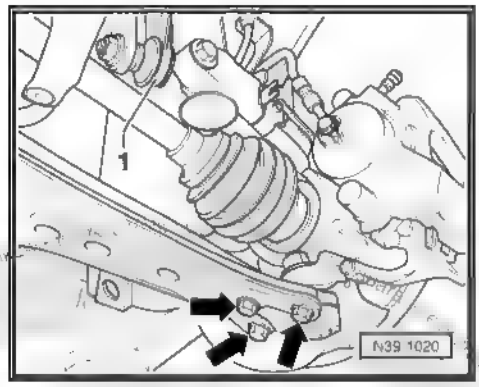
- Bushing and bearing extractor -VW 771-
- Complement -VW 771/37-
- Thrust pad -T10082-
- Drip tray -VAG 1306-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- Torquemeter - 40 to 200 Nm (socket 1/2") -VAG 1332-



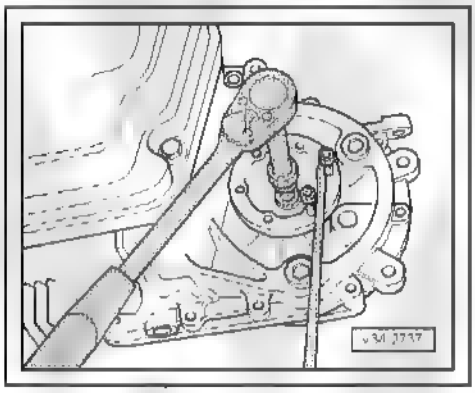
1.1.1 Removal

- Remove left side wheel.
- Turn the steering wheel to the left stop.
- Remove drive semi-shaft from the transmission propelling flange ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 , Front suspension .

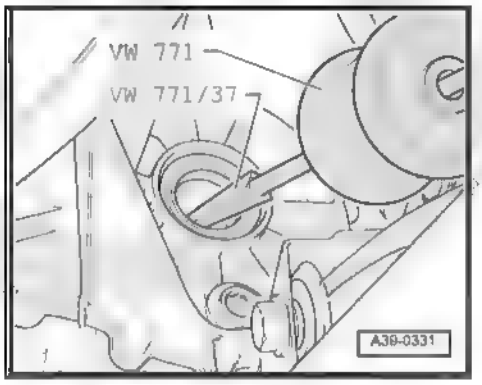
- Mark the installation position of the screws -arrows- that fasten the lower joint of the left support arm of the suspension.
- Remove the attaching screws -arrows- ⇒ Running gear, ?? axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Remove the coupling rod -1- from the stabilizer, if applicable ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Place the drive semi-shaft upwards and fasten it with wire on the suspension pillar.



- Remove the propelling flange fastening screw by using two screws to lock the flange with a lever.
- Place a Drip tray -VAG 1306- under the transmission.
- Remove the propelling flange with the spring.

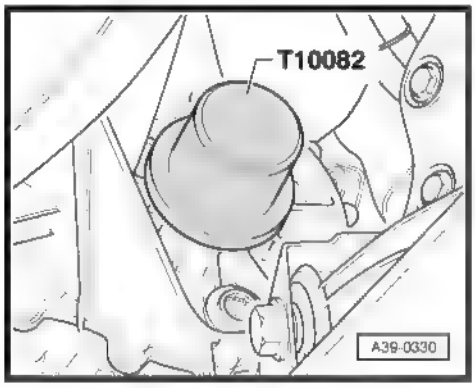


- Remove the propelling flange retainer with the Bushing and bearing extractor -VW 771- and Complement -VW 771/37- .



1.1.2 Installation

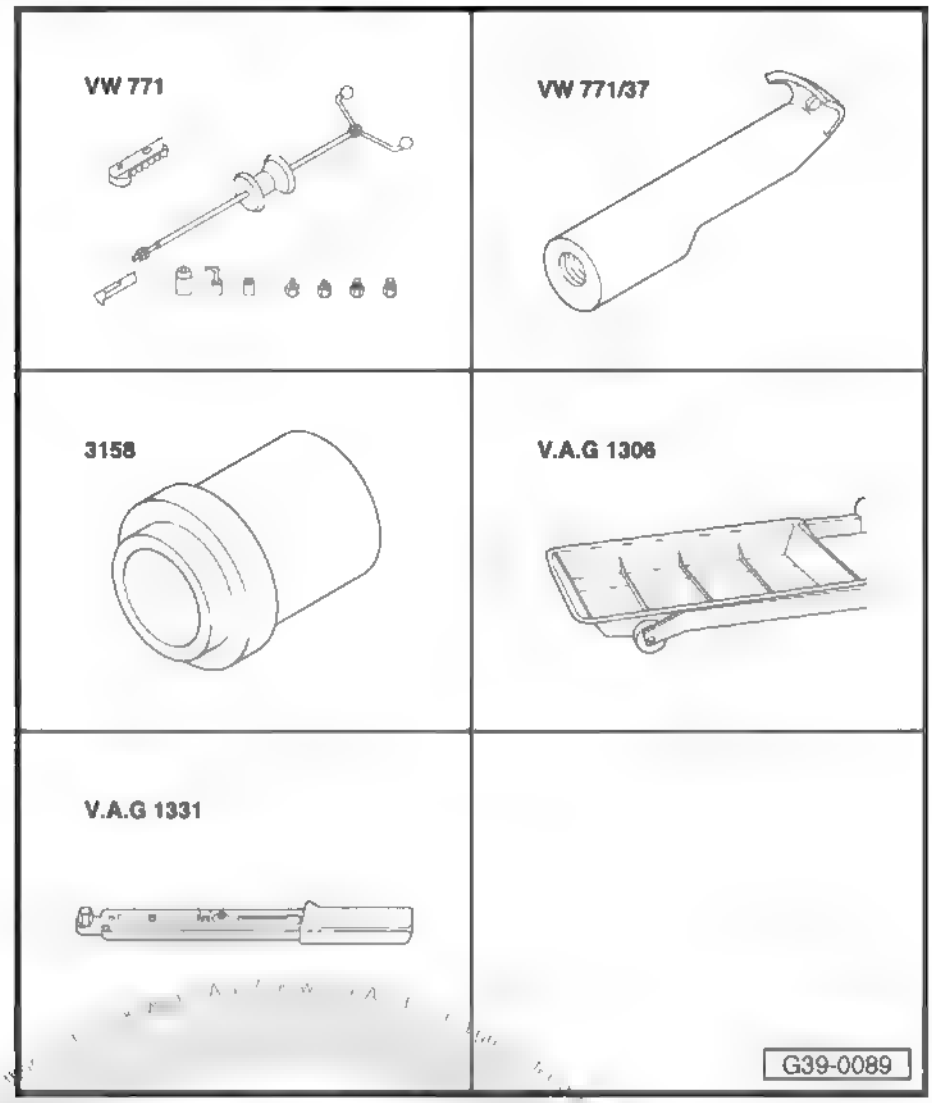
- Install the new retainer to the stop, without tilting it.
- Fill the half space between the sealing lip and the bellows with Grease -G 052 182 A1- , or consult the ⇒ Chemical Materials Manual .
- Install the propelling flange, fastening it with the tapered screw.
- Install drive semi-shaft on the transmission propelling flange ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Check hydraulic oil level and replenish, if necessary ➢ page 62 .
- Install noise insulation
- Install the wheel. Tightening torques, refer to: ⇒ Running gear, ??axles, ??steering; Rep. Gr. 44 ; Wheels, tires, vehicle measurement .



1.2 Right propelling flange retainer - replace

Special tools and workshop equipment required

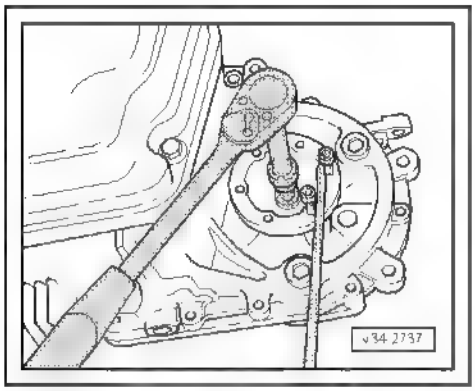
- Bushing and bearing extractor -VW 771-
- Complement -VW 771/37-
- Fitting sleeve -3158-
- Drip tray -VAG 1306-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-



1.2.1 Removal

- Remove noise insulation.
- Turn the steering wheel to the right stop.
- Remove drive semi-shaft from the transmission propelling flange ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Place the drive semi-shaft upwards and fasten it with wire on the suspension pillar

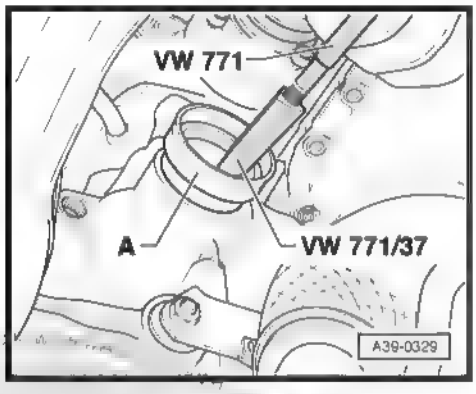
- Remove the propelling flange fastening screw by using two screws to lock the flange with a lever.
- Place a Drip tray -VAG 1306- under the transmission.
- Remove the propelling flange with the spring.



- Remove the propelling flange retainer with the Bushing and bearing extractor -VW 771- and Complement -VW 771/37- .

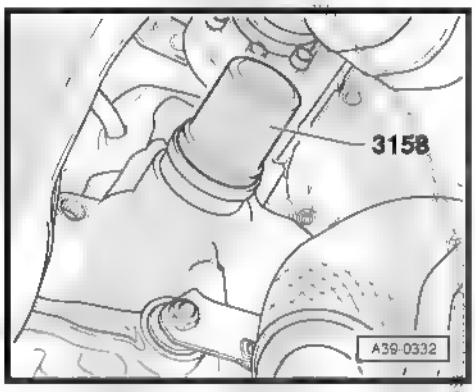
Note

- *Do not damage retainers -A-; otherwise, leaks may occur.*
- *Replace the retainer, if damaged.*



1.2.2 Installation

- Install the new retainer to the stop, without tilting it.
- Fill the half space between the sealing lip and the bellows with Grease -G 052 182 A1- , or consult the ⇒ Chemical Materials Manual .
- Install the propelling flange, fastening it with the tapered screw.
- Install drive semi-shaft on the transmission propelling flange ⇒ Running gear, ??axles, ??steering; Rep. Gr. 40 ; Front suspension .
- Check hydraulic oil level and replenish, if necessary ⇒ page 62 .
- Install noise insulation.

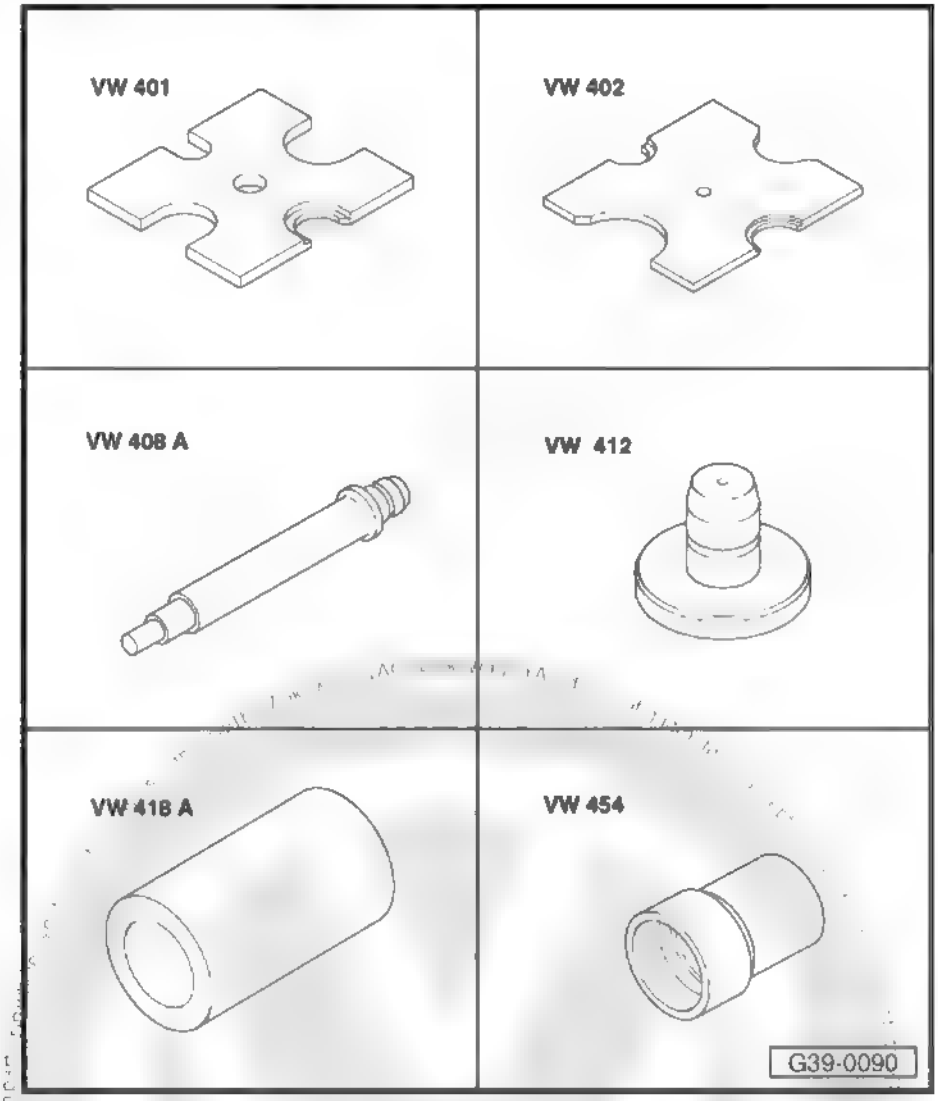


2 Differential - repair

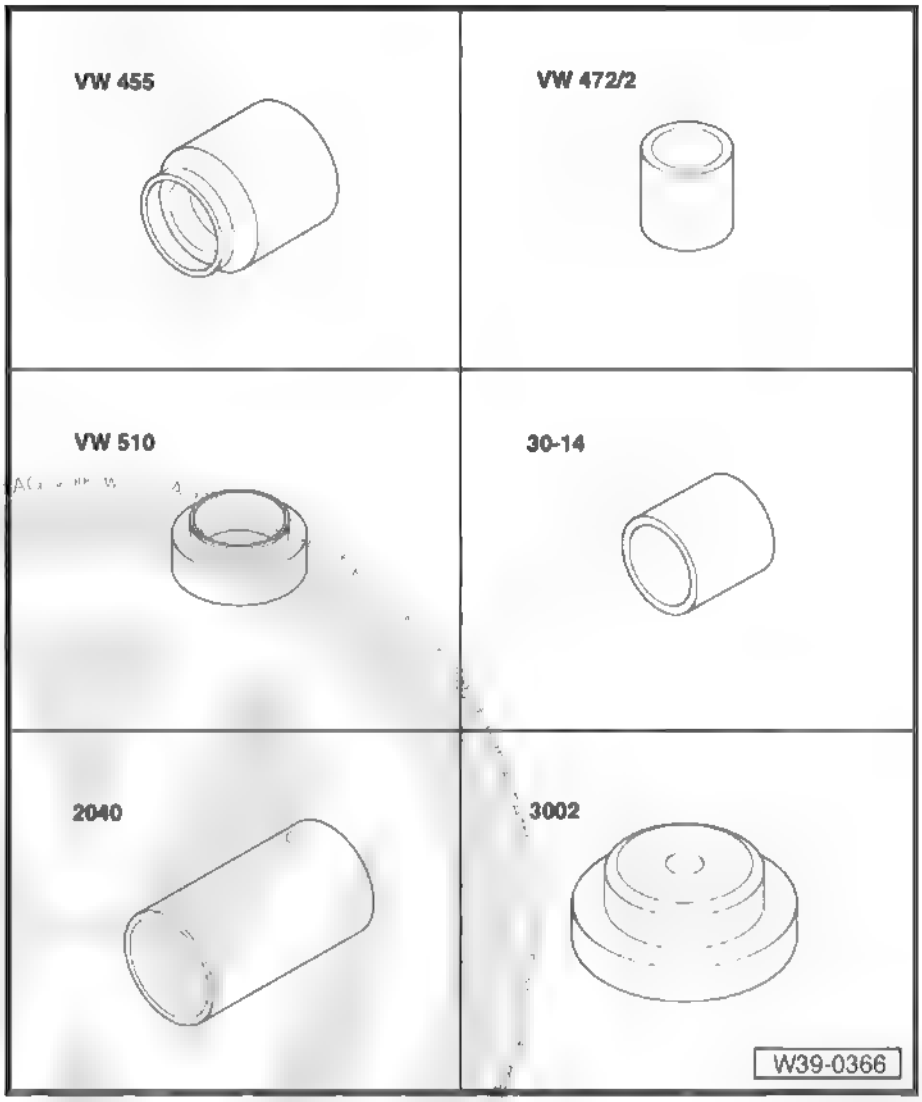
2.1 Differential - disassemble and assemble

Special tools and workshop equipment required

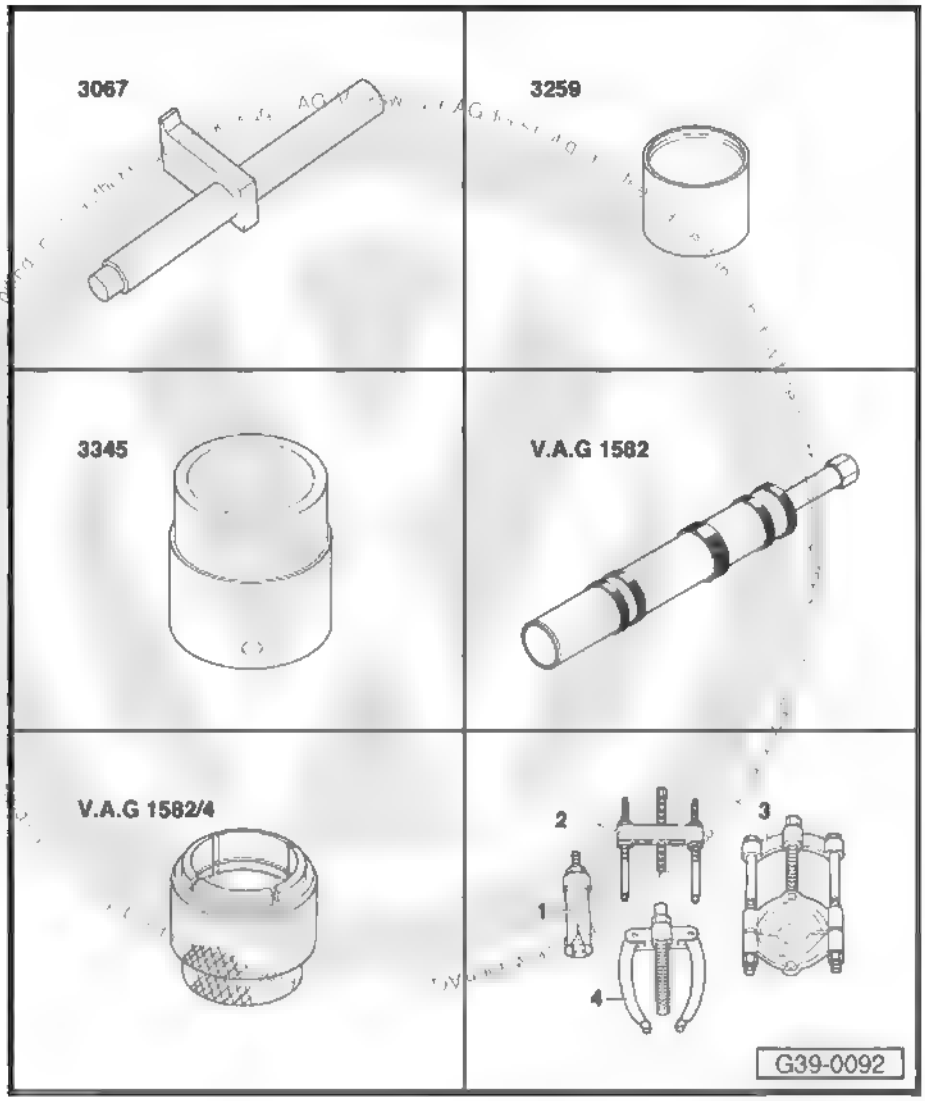
- Thrust plate -VW 401-
- Thrust plate -VW 402-
- Pressure pin -VW 408A-
- Pressure Disc -VW 412-
- Pressure tube -VW 418A-
- Pressure tube -VW 454-



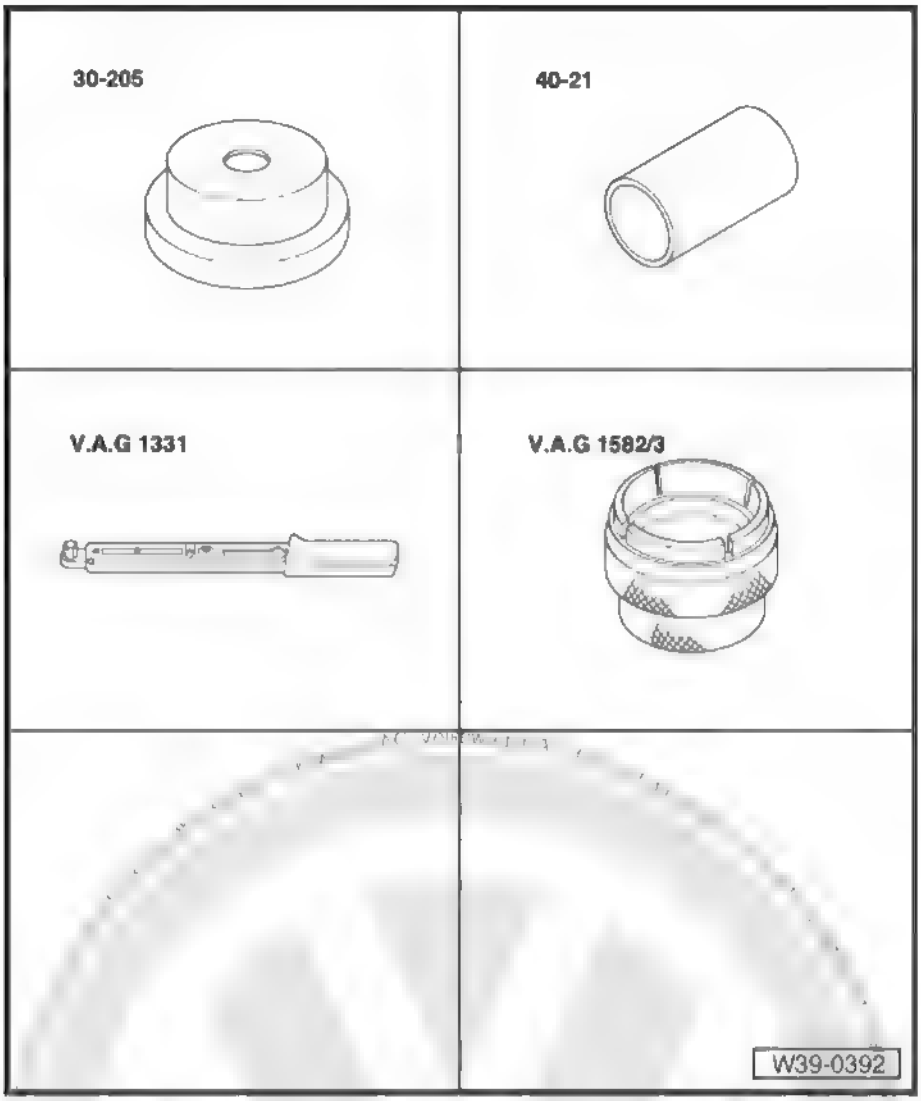
- Fitting tool -VW 455-
- Sleeve -VW 472/2-
- Thrust pad -VW 510-
- Extractor tube -30-14-
- Tube -2040-
- Pressure base or 3002 -VW 3002-



- Latch -3067-
- Tube -3259-
- Fitting tool -3345-
- Bearing extractor -VAG 1582-
- Caliper -VAG 1582/4-
- -1- Extractor 46 - 56 mm or VW 020T -Kukko 21/7-
- -4- Auxiliary support -KUKKO 22/2-

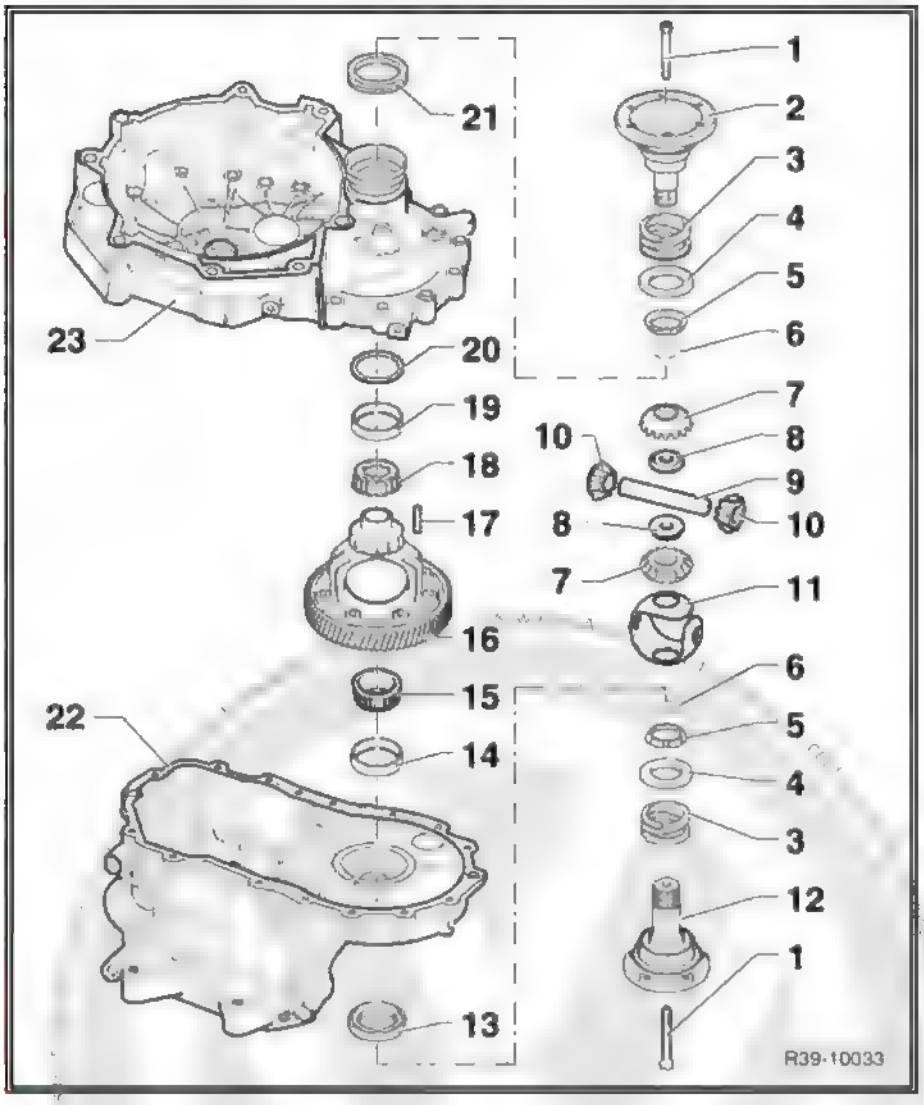


- Pressure base or VW 062 -30-205-
- Support tube -40-21-
- Torque wrench - 5 to 50 Nm (socket 1/2") -VAG 1331-
- Caliper -VAG 1582/3-



Note

- *Heat inside ring on the tapered roller bearing to 100 °C before installing.*
- *Always change both tapered roller bearings as a set*
- *Adjust the differential when replacing the tapered roller bearings, differential case, transmission case or clutch case* *⇒ page 119* .



1 - Tapered screw
- ❑ 25 Nm
- ❑ Fasten on the threaded part ➔ Item 8 (page 115) .

2 - Right propelling flange
- ❑ Do not invert. The right and left propelling flanges are different.

3 - Pressure spring for propelling flange
- ❑ Installed behind the propelling flange.

4 - Sealing washer
- ❑ Installation position: lip faces pressure spring.

5 - Tapered ring
- ❑ Installation position: taper towards differential housing.

6 - Circlip
- ❑ Retains the tapered ring, sealing washer and spring in position when the propelling flange is removed.

7 - Planetary gear
- ❑ Installation ⇒ page 118

8 - Flanged shaft nut
- ❑ Installation ⇒ page 118

9 - Satellite shaft
- ❑ To remove, cut the elastic pin ⇒ Item 17 (page 116) .
- ❑ Installation ⇒ page 118

10 - Satellite
- ❑ Installation ⇒ page 118

11 - Stop cover for satellite gears
- ❑ Install lubricated with transmission oil.

12 - Left propelling flange
- ❑ With retainer plate.
- ❑ Do not invert. The right and left propelling flanges are different.

13 - Retainer for the left propelling flange
- ❑ Left and side diameters are different.
- ❑ Replace ➔ page 107 .

14 - Outside ring on the tapered roller bearing
- ❑ Removal ➔ page 116
- ❑ Installation ➔ page 117

15 - Tapered roller bearing
- ❑ Removal ➔ page 118
- ❑ Installation ➔ page 119

16 - Differential box
- With riveted differential master gear
- If it is necessary to replace it, the pinion shaft shall also be replaced ⇒ Item 3 (page 100) .

17 - Elastic pin
- To fasten satellite shaft

18 - Tapered roller bearing
- Removal ⇒ page 117
- Installation ⇒ page 118

19 - Outside ring on the tapered roller bearing
- Removal ⇒ page 117
- Installation ⇒ page 117

20 - Adjustment shim S_2
- For the differential.
- Determine thickness ⇒ page 119 .

21 - Retainer for the right propelling flange
- Left and side diameters are different.
- Replace ⇒ page 107 .

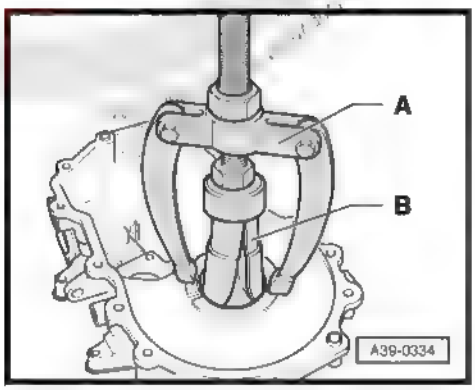
22 - Transmission case
- Manufactured in aluminum.
- Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- Repair ⇒ page 78 .
- Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface of the transmission case.
- In case of replacement, always adjust differential ⇒ page 119 .

23 - Clutch case
- Manufactured in aluminum.
- Allocation ⇒ Electronic Parts Catalogue (ETKA) .
- Repair ⇒ page 78 .
- Apply the Sealing putty -AMV 188 200 03- evenly on the sealing surface of the transmission case.
- In case of replacement, always adjust differential ⇒ page 119 .

Removing the outside ring on the tapered roller bearing of the transmission case

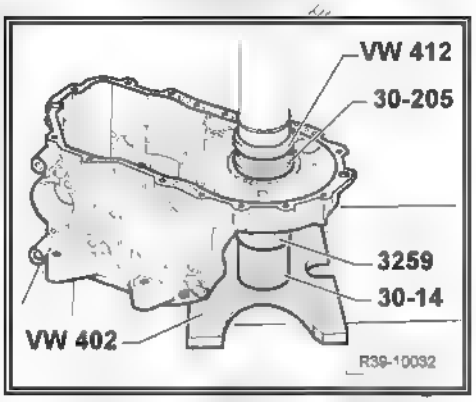
A - Auxiliary support -KUKKO 22/2- .

B - Extractor 46 - 56 mm or VW 020T -Kukko 21/7- .



Installing the outside ring of the tapered roller bearing on the transmission case

– Support the transmission case by placing the Tube -3259- directly below the bearing support.

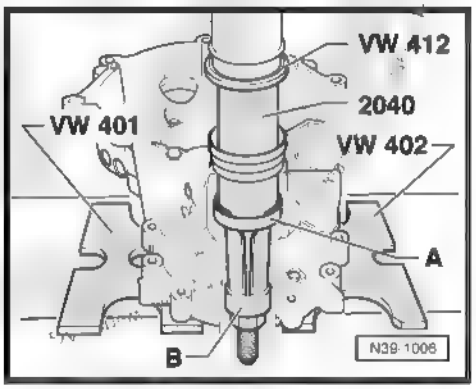


Removing the outside ring on the tapered roller bearing -A- of the clutch case

– Using Extractor 46 - 56 mm or VW 020T -Kukko 21/7- -B- to remove the outside ring from the tapered roller bearing.

Note

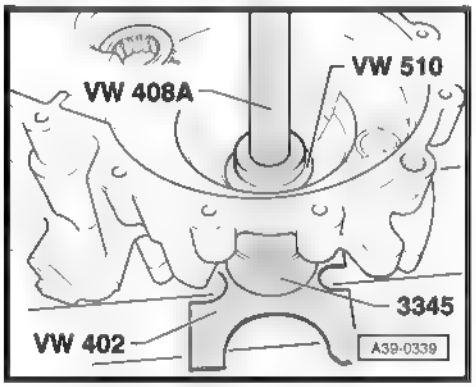
Remove the Speed sensor -G22- before removing the outside ring from the tapered roller bearing.



Installing the outside ring on the tapered roller bearing of the clutch case

– Support the clutch case by placing the Fitting tool -3345- directly below the bearing support.

– Install the Speed sensor -G22- after installing the outside ring of the bearing.

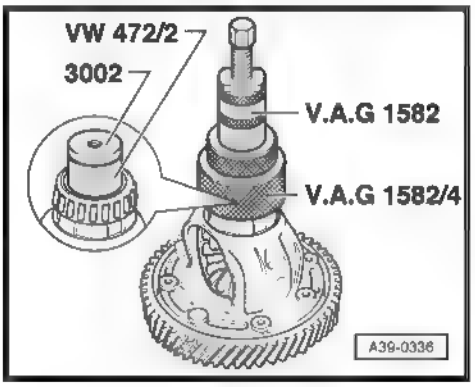


Removing the inside ring from the tapered roller bearings

– Before installing the extractor, install the Sleeve -VW 472/2- - VW 472/2- and the Pressure base or VW 3002 -3002- on the differential case.

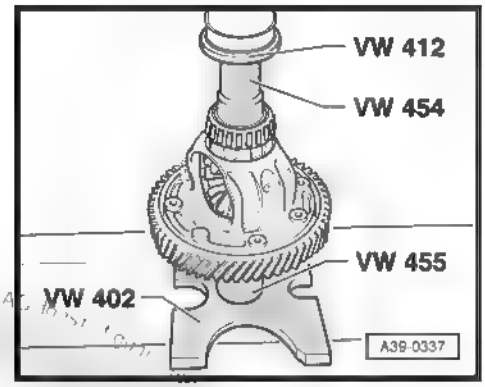
Note

The internal tracks on both roller bearings are removed in an identical way as for the differential case.



Installing the inside ring on the tapered roller bearings

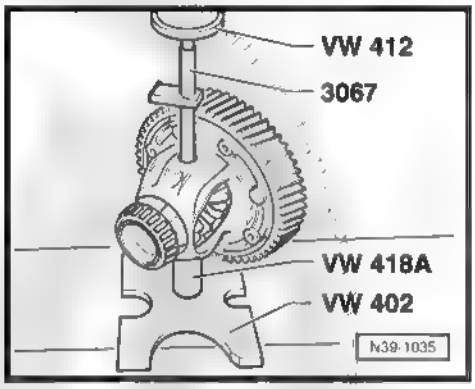
– Support the inside ring on the opposite side with the Fitting tool -VW 455- .



Removing the satellite shaft

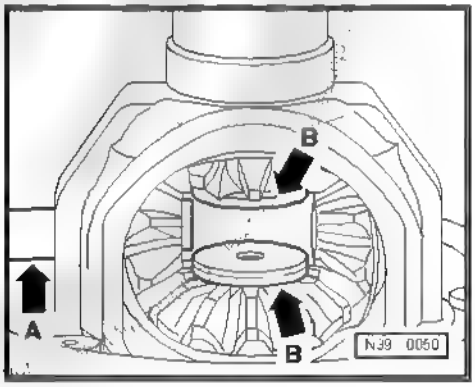
Cut the elastic pin to remove the shaft.

– Remove the elastic pin remains from the differential case.



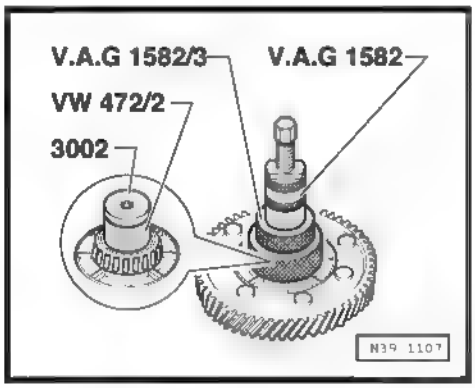
Installing the planetary and satellite gears

– Lubricate the stop cover of the satellite gears with transmission oil.
– Install the two planetary gears and lock them (for example, with the propelling flange).
– Install the satellite gears displaced by 180°.
– Install the satellite shaft -arrow A- to the first satellite.
– Install nuts -arrows B- on the planetary gears. Installation position: edge facing planetary gear.
– Install the satellite shaft to the stop and fasten it with the elastic pin.



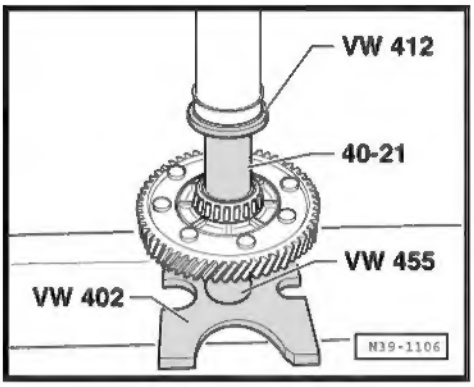
Removing the inside ring from the tapered roller bearing

– Before mounting the pulling device, place the Sleeve -VW 472/2- and the Pressure base or VW 3002 -3002- in the planetary gear box.



Installing the inside ring on the tapered roller bearing

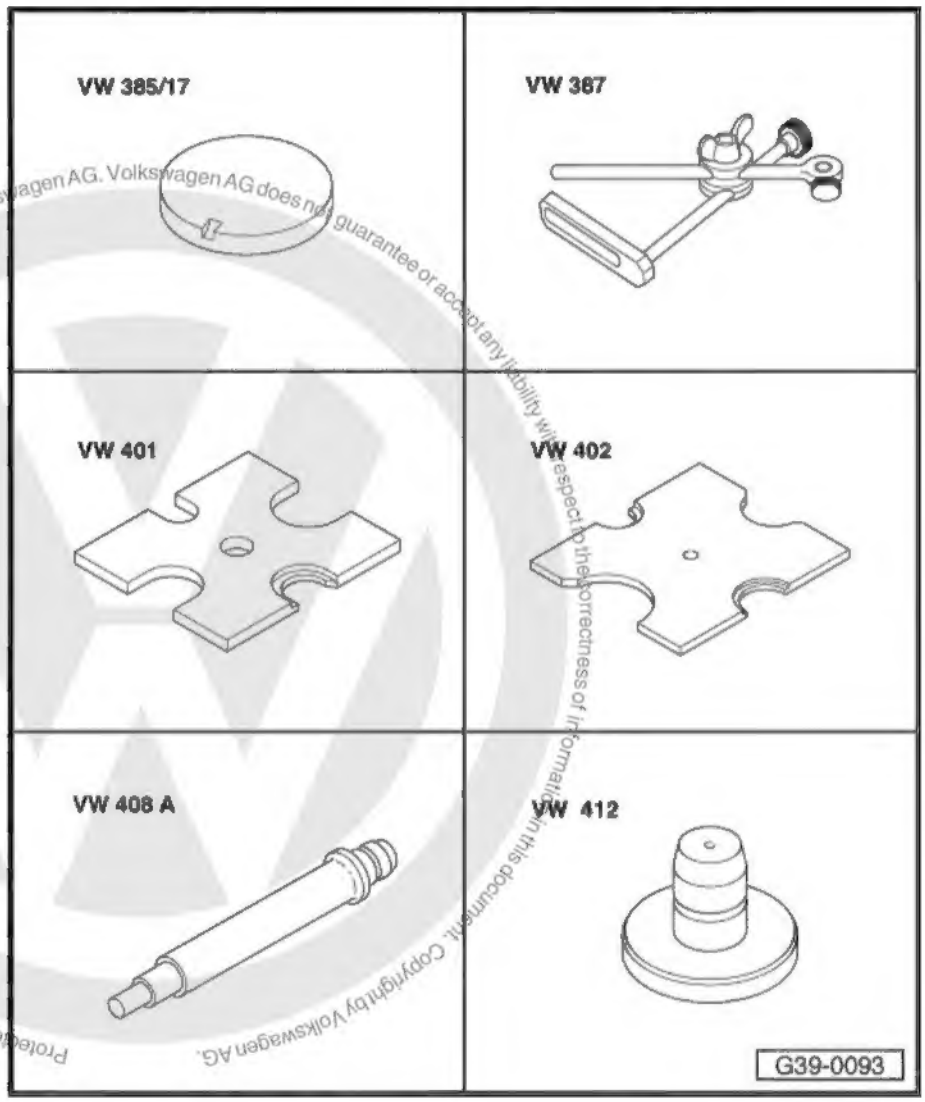
– Support the inside ring on the opposite side with the Fitting tool -VW 455- .



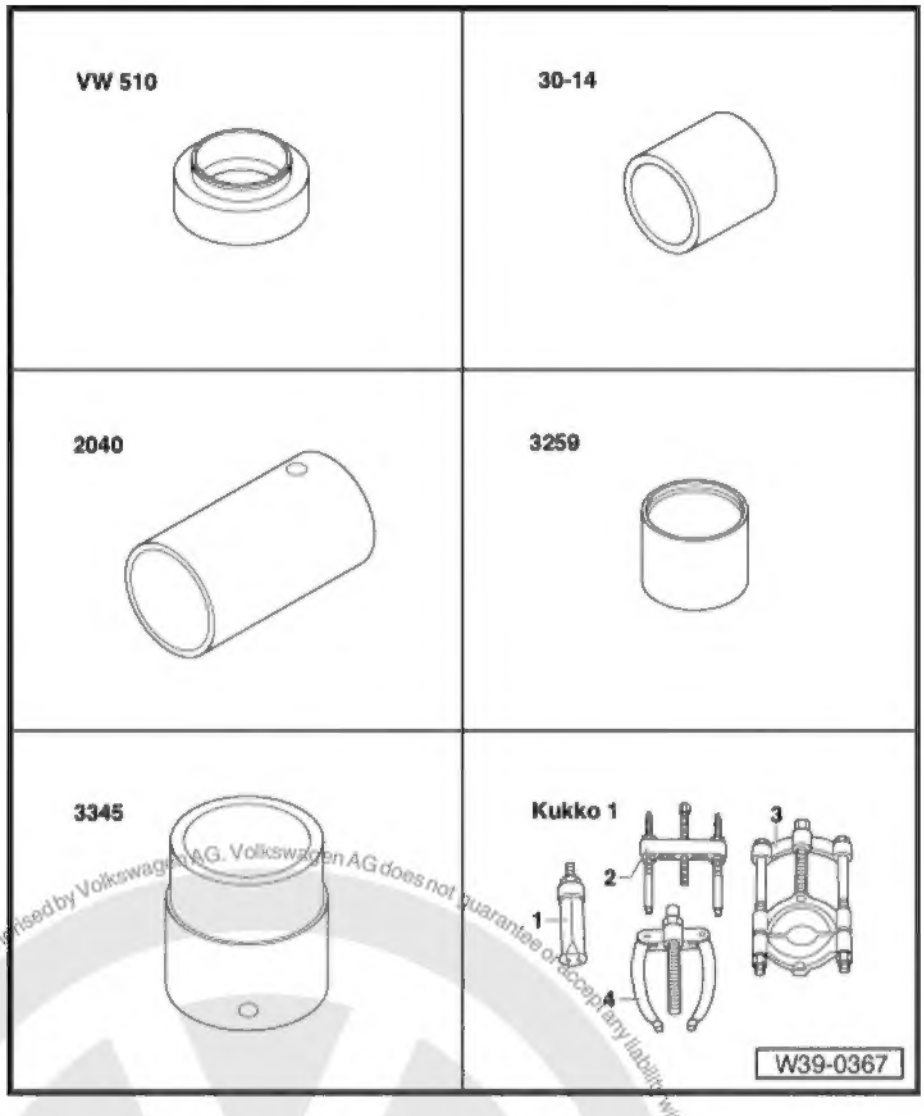
2.2 Differential - adjust

Special tools and workshop equipment required

- Measuring disc or VW 385 -VW 385/17-
- Support -VW 387-
- Thrust plate -VW 401-
- Thrust plate -VW 402-
- Pressure pin -VW 408A-
- Pressure Disc -VW 412-



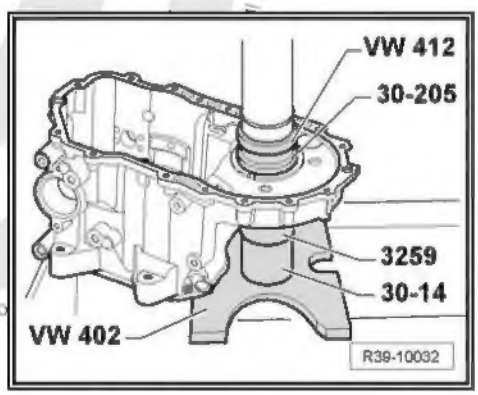
- Thrust pad -VW 510-
- Extractor tube -30-14-
- Tube -2040-
- Tube -3259-
- Fitting tool -3345-
- -1- Extractor 46 - 56 mm or VW 020T -Kukko 21/7-



The differential shall be adjusted when replacing the following components:

- Transmission case.
- Clutch case.
- Differential box.
- Tapered roller bearings of the differential.

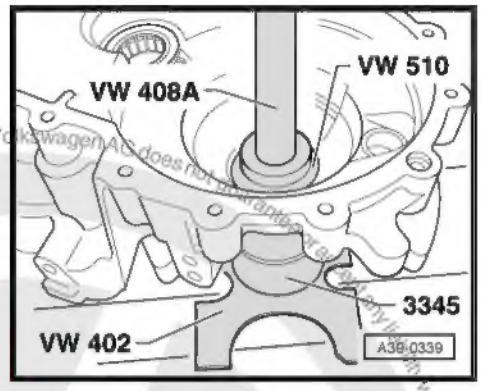
– Install the outside ring of the tapered roller bearing (pinion side) in the transmission case ⇒ page 117 .



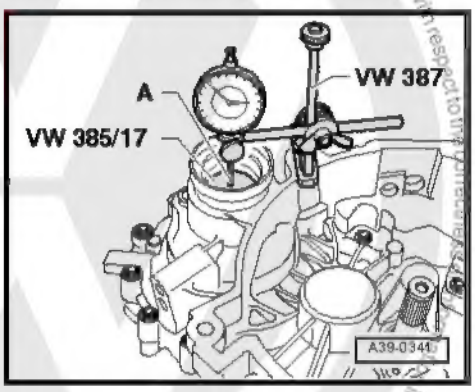
Note

The inside and outside tracks of the tapered roller bearings form an assembly (pairs) and should not be inverted.

- Install the outside ring of the tapered roller bearing (opposite side of pinion) on the clutch case without adjustment shim.
- Install the differential on the clutch case.
- Install the transmission case and tighten the 5 screws to the corresponding tightening torque ⇒ Item 3 (page 68).



- Install the measuring device and the dial gauge by using an extender -A- of approx. 30 mm.
- Reset the dial gauge to zero with 1-mm pre-tension.
- Move differential up and down and recall play indicated on dial gauge and record it (in example: 1.50 mm).



Determine adjustment shim thickness S_2

The pre-tension required for the roller bearing is achieved by adding a constant pressure value (0.35 mm) to the value achieved during the measurement for S_2.

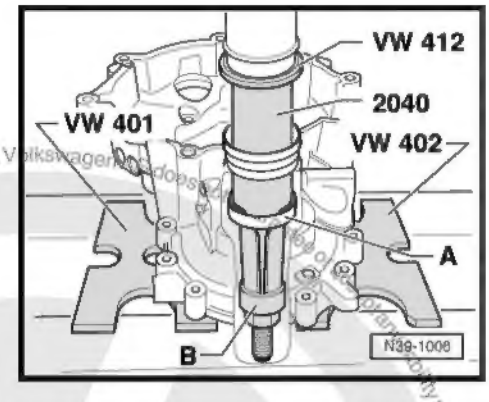
Example:

Measured value	1.50 mm
+ pressure (constant value)	0.35 mm
Adjustment shim S thickness$_2$ =	1.85 mm

– Remove the clutch case and the outside ring of the tapered roller bearing -A-.

B - Extractor 46 - 56 mm or VW 020T -Kukko 21/7- .

– Install adjustment shim S_2 with the corresponding thickness (in the example, 1.85 mm) and reinstall the outside ring of the tapered roller bearing in the clutch case ⇒ page 117



The following adjustment shims are available:

Thickness (mm)	Replacement parts No.
0,65	02K 409 210
0,70	02K 409 210 A
0,75	02K 409 210 B
0,80	02K 409 210 C
0,85	02K 409 210 D
0,90	02K 409 210 E
0,95	02K 409 210 F
1,00	02K 409 210 G
1,05	02K 409 210 H
1,10	02K 409 210 J
1,15	02K 409 210 K
1,20	02K 409 210 L
1,25	02K 409 210 M
1,30	02K 409 210 N
1,35	02K 409 210 P
1,40	02K 409 210 Q

The existence of different tolerances enables calibrating the required shim thickness with accuracy.

If the required thickness for the adjustment shim is greater than that indicated on the table, install 2 shims which thickness sum is equivalent.

– Install the transmission case and tighten the screws to the recommended tightening torque ⇒ Item 3 (page 68) .

05.11